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CUSHMAN & WAKEFIELD

West London Strategic Infrastructure Delivery Plan 2021-40

Final Report

March 2022

Notice

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This document has 259 pages including the cover, Executive Summary and Appendices.

Document History

Version	Final Report - West London Strategic Infrastructure Delivery Plan
Date	24/11/2021
Review	Draft Final Report reviewed and agreed with WLA
Supporting documents	Appendix A: Property Market and Opportunity Areas Report; Cushman and Wakefield

Contents

Report Note

This provides the Strategic Infrastructure Development Plan (SIDP), following previously shared SIDP Working Report, Draft SIDP and draft Final SIDP for which comments were received from the WLA and partners. This report is accompanied by Appendix A: Property Market and Opportunity Area Report and Accompanying Maps 1-8.

Note on COVID-19

In interpreting the assessment contained in this report, it is important to highlight that the outbreak of the Novel Coronavirus (COVID-19), declared by the World Health Organisation as a “Global Pandemic” on the 11th March 2020, has impacted global financial, development, infrastructure and other markets.

As at the date of this report, we consider that we can attach less weight to previous property market and other evidence for comparison purposes, to inform viability, pricing and related recommendations and advice.

Indeed, the current response to COVID 19 means that we are faced with an unprecedented set of circumstances on which to base judgement. Across the housing and infrastructure industry, partners and stakeholders are reassessing priorities for the short to medium term. This includes the availability of and criteria for private and public sector funding.

Given the unknown future impact that COVID-19 might have on the real estate and infrastructure markets, we recommended that the advice contained in this report is subject to regular review.

Executive Summary

The Executive Summary firstly provides an overview of the purpose and growth context for the Strategic Infrastructure Delivery Plan (SIDP). This is followed with key findings for each infrastructure type, including the identified needs of a West London strategic nature and their funding and delivery considerations. Recommendations are highlighted for the West London Alliance, West London authorities and other partners. The Executive Summary concludes with a series of next steps.

Purpose

This report is a Strategic Infrastructure Delivery Plan (SIDP) for the seven London Boroughs that form the West London Alliance (WLA) – Barnet, Brent, Ealing, Hammersmith and Fulham, Harrow, Hillingdon and Hounslow, as well as the Old Oak and Park Royal Development Corporation (OPDC). The purpose of the SIDP is to provide information on future strategic infrastructure requirements. These requirements are those that are deemed critical to enabling planned housing and commercial space growth within West London, as well as potential increments over and above the baseline, in line with strategic policy objectives.

The SIDP has been created in the context of significant expectant growth and sets out a series of ambitious recommendations and potential projects. The realisation of these will inevitably be subject to resourcing, prioritisation and evolving circumstances. It will also require all infrastructure providers to work proactively with local authorities to ensure their needs are understood and improvements in provision can be realised.

The report is structured as follows:

- **Section 1: 'Introduction**' sets out the purpose of the SIDP alongside the definitions, approach and engagement used.
- **Section 2: 'Context'** provides an overview for the growth, infrastructure and property market trends for London, West London and the Boroughs, as well as the strategic policy context.
- **Section 3: 'Growth and Demand Drivers'** provides projections and targets for population, housing and employment, and sets out the strategic sites for the SIDP.
- **Section 4: 'Strategic Infrastructure Baseline and Needs'** is structured by each infrastructure sector in turn and provides the:
    - Baseline - strategic priorities and current provision and challenges for West London's infrastructure, by sector, and identified planned infrastructure as the future baseline.
    - Needs - the infrastructure needs as schemes and opportunities to support West London's strategic growth and address the identified challenges.
- **Section 5: 'Infrastructure Need Categorisation'** takes the identified infrastructure needs and assesses their priority status and site impact at the West London strategic level.
- **Section 6: 'Funding and delivery'** sets out the potential funding approaches and delivery mechanisms to realise the priority infrastructure needs.

Growth context

West London is expecting significant growth, which will require infrastructure to support this growth whilst the climate change context brings new expectations for how this growth is supported – to protect against urban heat, flooding risk and drought and support Net Zero delivery.

West London's population is projected to increase by 343,800 people to 2040, at a similar growth rate to London as a whole, with Brent and Hammersmith and Fulham projected to grow at a greater rate.

There is a network of key housing/ employment growth areas, though some are less well linked to existing and future anchors e.g. workplaces, West London town centres, significant open space, transport interchanges.

Eleven Opportunity Areas exist in West London, together representing indicative housing delivery of 105,000 homes and 140,000 jobs, and further strategic growth areas and sites are recognised. There are potential agglomeration benefits of linking Opportunity Areas, as an increased growth dividend and wider impacts from investment in infrastructure, whilst providing provision and connectivity to the

areas between. Investment such as the West London Orbital (WLO) can increase economic and social interaction and link opportunities, helping to foster a stronger and more cohesive sense of place for this part of West London.

These growth areas determine notable cross-boundary areas which may drive infrastructure demand pressures and pinch-points, including:

- the A5 corridor through Brent, Barnet and Harrow and multiple strategic growth sites;
- the A40/ M1 and Elizabeth Line corridor with Southall and Hayes, and growth extending West;
- the A406 corridor and meeting of proposed WLO stations with Brent Cross, Wembley and through to Old Oak Common/ Park Royal; and
- Growth through the M4 and A4, clustered with the Great West Corridor and West of Hounslow.

Alongside the corridors used by the Mayor in the new London Plan (Highspeed 2/ Thameslink; Heathrow/ Elizabeth Line West), work by the WLA and partners on the WLO is starting to identify scope for an orbital corridor, linking Old Oak with Barnet and Brent to the north and east and Ealing and Hounslow to the south and west. This may provide a new "centre of gravity" to the sub-region.

Strategic Infrastructure Recommendations for West London

Summary - Needs

The SIDP analysis (Section 4) demonstrates that there are significant strategic infrastructure needs across all types to be delivered to accommodate both the renewal of assets for the existing West London population and to provide for future growth.

This includes some major transport needs ranging from new rail and road schemes, line extensions, station upgrades and corridor enhancements.

For energy, which is a sector undergoing substantial transformation to a new net zero carbon world, considerable investment is needed to deliver decentralised energy programmes to Opportunity Areas and roll out zero emission networks. Cross boundary collaboration at a West London level in the planning and delivery of future energy infrastructure will be critical.

Significant investment in maintaining future water supply and the mitigation of flood risk are also of particular importance to West London.

Investment in green infrastructure is a key component in West London's place making agenda and innovative use of new digital infrastructure will need to be planned in a manner which is integrated with other forms of infrastructure intervention (e.g. transport).

Recommendation 1: The WLA and West London authorities to continue strategic infrastructure planning at the sub-regional level. There is value in infrastructure being considered strategically and from a cross-boundary perspective to help West London's growth areas meet and, in some cases exceed, their indicative housing and employment delivery. The growth areas could contribute more than the sum of their parts, in housing and employment delivery and in meeting the sub-region's strategic aspirations. This is based on the growth area infrastructure provision having an impact beyond the area itself and where this is coordinated and integrated to respond to the sub-region's climate change, socio-economic and place challenges to 2040.

Covid-19 Impact and Considerations

The SIDP has taken note of the Covid-19 impact and potential legacy across the different infrastructure types, with considerations on the nature of demand and emerging sector understanding. This is summarised below.

- Transport schemes will need to be reviewed in light of Covid-19 and broader changes in users' behaviours. Specific points should be particularly considered:
    - Modal changes and impact on the public realm, with walking and cycling increasing there is a role for authorities to ensure these modes are safe and usable.
    - Trends towards home working may prove to have been permanently accelerated from the pandemic, rather than central employment locations workers may travel to a

range of local bases. This raises the role of local connectivity and rethinking of town centres and high streets to boost local sectors.

    - There is a risk of increased car use due to a reluctance to use public transport. This would worsen the congestion and air pollution situation that existed pre-Covid and could also impact progress made to improve active transport.

- The repercussions of the COVID-19 pandemic have led to a consideration of how the demand for energy and utilities will vary going forward. The future of work and leisure time as drivers of economic change may be accelerated as home and flexible working and home-based service consumption is further tested and become embedded as new habits.
- The resilience of the energy network for housing areas will be important going forward, and need to be considered for the Opportunity Areas planned to see high housing growth where the housing-commercial mix may change and reflect differentials in energy need.
- The Covid-19 pandemic and resulting lockdown measures emphasised the importance of household access to green space. This has been especially true in areas where many households lack a garden or outside space. Green infrastructure has provided an important role in the ability of people to walk and cycle during this time, alongside the emerging streetscape and temporary cycle route provisions. A lack of access is detrimental to wellbeing and can compound socio-economic disparities.
- The indicative scale of employment growth to 2040 in West London provides a strong driver for the provision of appealing active mode access between residential and employment areas. Green infrastructure has a role in reducing congestion and overcrowding on transport routes, alongside air quality and health benefits, for shorter journeys of those who live and work within West London.
- The Covid-19 pandemic has raised demand for both high speed broadband and 5G through remote working, remote education provision and access, home-based leisure time, home-based health and social service consultation, and small business moves online to meet customer demand. These drivers of economic change may be accelerated as home and local hub service consumption is further tested and embedded as new habits.
- The roll out of full fibre and 5G is critical for business to be resilient, in building and responding to the changing demands of customers including goods and service delivery.
- Digital providers identified that their network was largely resilient, and shortages/ outages were avoided, whilst peak patterns of usage shifted. However, it was noted that in the years ahead there will be more smart devices that need to be connected, from individuals, premises and infrastructure networks (the 'internet of things'). Emerging trends will require digital needs to be revisited in the near future and technologies to improve London's connectivity may become dated where their rollout is slow.
- Higher education facilities may face difficulties with a drop in enrolments and accommodation take-up, impacting both their financial positions and reducing a key driver of local spend. A collaborative approach to potential responses may be required.

Oxford Economics Covid-19 impact reports for West London also highlighted particular areas of concern and areas of resilience. West London GVA fell by 10.7%, higher than the UK (10%) and London as a whole (9.4%). Jobs fell by 21,600 (1.9%) in 2020 and are forecast to fall a further 27,000 (2.5% of jobs) in 2021.

The Oxford Economics' reports have set out some key considerations:

- Making the economic case for West London and reassuring developers and investors is important for protecting regeneration schemes – West London's 11 Opportunity Areas – including, but not confined to, the case for transport investment.
- The public transport investment needed for several of the Opportunity Areas faces difficulties with potentially severe impacts on the capacity and willingness of the private and public sector to make commitments of the scale needed.
- A Covid-19 driven delay to Old Oak/Park Royal, or a scale back, would affect all parts of West London due to its scale and linkage to major transport investment. This delay or reduced

scale could be driven by a decline in the availability of private capital, a weak recovery of Heathrow and delays or halts to HS2 through a downside scenario.

- Heathrow Airport as a key asset faces unique challenges as the UK's largest passenger and cargo hub. Passenger numbers have nosedived, and macroeconomic impacts leave a question mark over long-term investment projects.

Recommendation 2: Given the unknown future impact that COVID-19 might have on the real estate and infrastructure markets, it is recommended that the advice contained in this report is subject to regular review.

Transport

A range of strategic transport needs have been identified in the SIDP (Section 4.2.4). An overall recommendation is for the WLA and West London authorities to collaborate in making the case for these interventions. The SIDP need categorisation exercise (Section 5) can support this collaboration in identifying the interventions that are of a sub-region strategic focus due to their suggested delivery timelines and geographic and development scale of potential impacts.

West London's strategic transport interventions

Overall, transport infrastructure proposals of a West London, or wider region, strategic level have been identified (Section 5.2.1)

With the dramatic impact of Covid-19 on daily lifestyles and travel behaviour, there is considerable uncertainty at present regarding the future investment plans for transport in London. TfL funding for design and implementation of projects has been put on hold and there would need to be a review of all projects in light of changing user behaviour due to Covid-19. However, TfL remain in support of investment in key growth-enabling transport infrastructure in West London including, in particular, West London Orbital (WLO). The Secretary of State's June 2021 letter to the Mayor of London[1] about the basis of Government funding reiterated the uncertainty of longer-term transport demand and the need to keep transport projects under review until it becomes clearer whether, and how, the pandemic has a lasting impact on transport usage.

Although the impact of the pandemic on Heathrow Airport has brought into question the proposals for expansion, there is a continuing need to ensure that surface access is as sustainable as possible. In particular, there remains a strong case for additional rail access for passengers, freight and other goods. West London boroughs should continue to work together and through the Heathrow Strategic Planning Group to ensure these issues are properly reflected as the future of the Airport are considered.

Recommendation T1: The WLA and West London authorities should continue to collaborate and establish clear evidence of the need and economic impact of strategic transport investment in the area. Moreover, investment in sustainable transport infrastructure and initiatives to enable and encourage modal shift remain critical for the sub-region. In partnership with the GLA, this should include consideration of sub-regional approaches to funding, including alternative mechanisms, for clearly identified public and sustainable transport priority projects.

Recommendation T1.1: The strategic transport interventions that the WLA and West London authorities should collaborate in case making should include ensuring sustainable access to Heathrow, including making the case for western and southern rail access, for either a two or three runway future.

Recommendation T2: Maximise the WLO opportunity and promote wider access

The WLO is a clear priority for West London. It will help deliver more homes and jobs; provide public transport connectivity in places where it is currently lacking; provide more public transport capacity; and help address a range of social, economic and environmental priorities. Its agglomeration benefits have been well established, in linking growth areas and their housing and commercial opportunities. The WLO Economic Development Narrative concluded: '*The WLO would contribute materially across a range of areas to help support local and regional objectives within the corridor. Moreover, the*

[1] ttps://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/990520/letter-secretary-of-state-mayor-of-london-june-2021.pdf

combined effect could increase economic and social interaction and opportunities across the corridor, serving to foster a stronger and more cohesive sense of place for this part of West London as a whole.'[2] It concluded that the WLO would deliver £16 million in wider economic benefits annually.

The WLO supports development with 15,774 homes assessed to be supported by the scheme. This includes over 9,100 homes dependent on the WLO across Barnet, Brent and Hounslow, within 1km station catchments; a potential 3,000+ homes within Ealing; and further sites beyond the 1km catchments.

As part of work to establish the business case for the WLO, TfL have assessed other interventions that might deliver the same strategic objectives. Looking at a wide range of different modes and options. The short-listed options determined by TfL's Option Assessment Report (2020) were all heavy rail options as full and shorter route lengths, showing that other options (such as buses and trams) did not provide the same levels of benefit and/or were poorer value for money. The Options Assessment Report demonstrated that the WLO is the best option for the corridor, confirming earlier work commissioned by the WLA.

Recommendation T2.1: The WLA and West London authorities should maximise the WLO opportunity from the route that will be taken forward by promoting the role of station masterplans. These will facilitate dependent development, create new sustainable and accessible transport hubs and provide wider place benefits, such as the masterplan being developed for Neasden to facilitate homes growth.

Recommendation T2.2: There should be a focus on wider areas of West London that can benefit from access to the Elizabeth Line and WLO stations. This includes station interchange with surrounding transport modes, transport network integration creating connection to growth areas (such as Wembley) and public realm and other action to ensure integration with the wider urban realm.

The SIDP sets out areas that could benefit from the Elizabeth Line and WLO access, and includes interventions such as:

- Greenford line enhancements with increased services between Greenford and West Ealing
- Wembley access to WLO stations via Neasden connections through cycle or bus provisions, as well as potential option for extending the Elizabeth Line to Wembley Central with WCML platforms reinstated at Willesden Junction
- Uxbridge access to Hayes and Harlington as the Elizabeth Line becomes operational
- Mill Hill and Finchley access to WLO stations in Barnet, through public transport and cycle enhancements.
- Harrow Crossrail spur to Old Oak Common as a longer-term aspiration in response to planned growth, providing connectivity to OOC/ Park Royal, Hounslow and Heathrow through utilising a disused rail line or express bus routes.

Recommendation T2.3: The WLA and its partners should assess the case for a range of express bus routes in response to the preferred WLO option – and in some cases bus rapid transit (BRT). Though the high costs of some proposed BRT scheme alternatives to WLO provision are recognised. Express bus provision will also require political backing and may require the removal of parking in some areas.

Recommendation T3: Phased and coordinated delivery of a West London strategic cycling network

The SIDP focusses on strategic needs for cycling infrastructure, considering the Opportunity Areas, linkages between residential and commercial centres and strategic transport hubs. Current areas of low PTAL are an important consideration, where cycling access to stations can be critical for those residents alongside decongested bus access.

A joined-up approach to a West London cycling network can support a step change in active mode use and transform congestion and poor air quality hotspots. Further, these routes can reduce the need for car parking provision at development and enhance the quality of place offer.

[2] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020)

A set of cycling interventions as 'West London Spine' and 'Local Centre Connections, including growth areas and stations'' are set out (Section 4.2.4). These routes have been identified in their linkages to strategic green infrastructure and corridor improvements. .

Recommendation T3.1: To progress an effective West London cycling network, a shared commitment to resource the required work with a governance basis for joint working toward implementation should be considered. Lessons from past experiences should be reviewed with the monitoring of uptake levels and areas of potential local demand. An early joint working effort could focus on reviewing current signage for cycling.

Recommendation T3.2: The WLA and West London authorities should consider developing a phased delivery and cost plan for the cycling routes identified in this SIDP in conjunction with TfL. This should coordinate the latest understanding of development site and station timelines. The delivery should be phased to facilitate new travel behaviours at development locations and in advance of new station services.

Recommendation T3.3: Any West London cycling network, and other measures intended to promote active travel, should have a particular focus on facilitating shorter and more local cycling routes. There is a need to look at sub-regional priorities as well as London-wide and strategic radial ones. This includes routes for schools and higher education, local jobs, retail and leisure, and green space access. There is scope for pan-West London coordination, working with TfL, developers and businesses, to develop a local centre hub and spoke element of the network. This should identify and direct resources to such local needs, which can serve a wider population of potential cycle route users and support local trip travel habit changes

Recommendation T4: Collaborative delivery of Electric Vehicle infrastructure

An important challenge for West London to address is that a consistent approach in terms of the technology, infrastructure and standards for development and other key sites is not yet there. This is partly driven by the sector uncertainty as to the most effective technology and infrastructure provision and whether the electricity supply and network capacity is and will be sufficient to meet demand. Without a set development standard and with low current asks of developers once development is complete the scale and type of provision may no longer be fit for purpose. There has also not been a coordinated plan for the roll out of electric vehicle charging points (EVCPs) to date, especially in public spaces and on street, with provision more ad hoc than focussed on achieving a well distributed network that benefits the boroughs and users.

There is a challenge of timeline alignment where a developer can agree to a level of EVCPs, with a risk that delivery may not prove sufficient in quantity, quality or type by the time the development is delivered. Though in order to meet the future demand for ECVPs in West London, consideration must be given now to their roll out, their effect on the immediate distribution network and power generation capacity.

For West London and its strategic growth areas, it will be difficult to install EVCPs to all domestic properties. As recharge times reduce, and EV range increases, Atkins' best estimate is that development of charger hubs will eventually replace current filling stations circa 2045. This should provide enough charging points for the domestic users. Non-domestic users (fleet owners, taxis etc) will also use the central hubs, but larger fleet owners would generally have dedicated EVCPs in their depots. This would likely require some upgrades at local sub-stations (or possibly entirely new provision), the costs of which need to be recognised.

Recommendation T4.1: An overall West London EV strategy should be developed with partners to ensure the correct scale, location and types of charging infrastructure can be provided. Coordination is required with EV producers, TfL and Highways England, the electricity distribution network operators (DNOs), the National Infrastructure Commission, Ofgem, the Office for Zero Emission Vehicles (OZEV) and London Councils' Go Ultra Low City Scheme. This strategy will need to include assessments of the ability of the local electricity supply infrastructure to support expanded use of electric vehicles, coordinating with DNOs and National Grid.

Recommendation T4.2: The strategy should promote a consistent approach across West London for EVCPs and other EVC infrastructure solutions. This can utilise West London's existing assets, such as industrial and logistics centres, retail and leisure centres, for charging infrastructure options, notably EVC forecourts and rapid super charging hubs. Chargers suitable for

public access, such as at retail / public car parks, urban centre streets where appropriate, leisure centres and charge pillars and lamp posts should be part of the provision response.

Recommendation T4.3: The strategy should monitor the emerging technology and cost effectiveness. This would need continual update as technology develops, charging rates change and the uptake of EV is more determined. Due to the continued fast pace development of both EV battery technology and respective charging, it will be prudent to deliver EVCP on a phased approach. Further, suitable land for charging forecourts, and potential hydrogen refilling points, may need to be safeguarded whilst parking space demand and use should be monitored. The ongoing maintenance needs of publicly accessible EVCPs must also be included in any strategy.

Recommendation T4.4: The strategy and joint working should include consideration on funding approaches. It will be important to discuss and ultimately assess ways of securing funding from the private sector and/or public/private partnerships, potentially with access to local authority-owned infrastructure as a lever.

Recommendation T4.5: A West London strategy should work towards setting standards, which could form the basis for development of planning policies , considering sector future proofing, with supplementary guidance and model s106 clauses. Planning requirements can mandate the provision of electric vehicles in new developments, in line with the new London Plan 2021. This may be a particular issue for non-residential development if provision in new homes becomes a Building Regulations requirement.

Recommendation T5: Support West London logistics transformation

Alongside modal shift to cycling and walking and the facilitation of zero emission vehicles for residents, the should be a focus on reducing the impact of HGVs and last mile delivery schemes using low or zero emission vehicles, consolidation centres and utilising digital technology. It is recognised that the Opportunity Areas and West London's nationally significant logistics role provide excellent potential to shape delivery and servicing activity across the sub-region and through to the wider South East and UK.

One emerging scheme is Magway parcel delivery service as a safe, reliable, fast and sustainable system. A proposed route that has been consulted on passes West London commercial centres including Old Oak Common and Park Royal, Shepherd's Bush, Kensington Olympia and Earls Court. Further extensions are possible, notably a route North to Watford potentially via Wembley, opening up to more of the UK; a route west to Heathrow and the West of England using the Great Western corridor; and a route east to Paddington. Once at the river, capacity can be provided to further logistics centres and development sites. Further, low-carbon energy could be transported through the network, such as through battery storage at nodes, supporting EV charging.

This concept and other such innovations have important interactions with a West London strategic cycling network and EVC infrastructure in respect of delivery from route urban fulfilment centres. Digital capacity and innovation is another important interaction, controlling the delivery control system and aligning to use cases for delivery management and logistic consolidation.

Recommendation T5.1: The WLA and West London authorities should coordinate with the relevant parties for emerging logistics innovation schemes. This should incorporate the emerging concepts and their strategy and working with partners for sustainable transport, digital and innovation delivery in a collaborative and challenging manner.

Magway is one concept for the logistics sector in meeting sustainability and future proofing objectives. This should be looked at in more detail to understand its viability factors, timetables and processes for implementation and its potential as part of a wider network.

Recommendation T5.2: The WLA and West London authorities should develop understanding of the commercial pressures driving developments in the logistics sector. Partnerships with the sector and its customers will be key in enabling such changes in logistics and ensuring their benefits are optimised. The move toward more innovative and sustainable logistics would be supported by a sub-regional challenge to businesses to be more effective in their supply, procurement and waste policies.

Net Zero, decarbonisation and energy

Energy infrastructure proposals have been identified (Section 5.2.1). Whilst the energy proposals may themselves reflect a local strategic site impact, the provision of energy generation, distribution and

storage to meet Net zero goals is of a West London strategic significance. The energy baseline identified various challenges with delivering the required transformative solutions. Across the Opportunity Areas there has been mixed progress on the development of, and commitment to, district heat networks and decentralised energy networks with progress being stalled in places with a lack of a clear finance and funding case.

The Energy White Paper (2020) clarified a strategy for the wider energy system that is transformative as a 'Green Industrial Revolution' to meet the Government's Ten Point Plan. Several of these points have high relevance for West London including zero-emission transport, green public transport and active mode investment; the potential for hydrogen in heating buildings and fuelling vehicles; the use of heat capture from buildings and decentralised energy and district heating networks; the protection of use of green infrastructure; and the potential funding streams available.

West London has a nationally significant logistics sector with transport assets and modes that provide an opportunity for a leading response to decarbonisation – with zero emission freight vehicles and solutions including Magway to transport goods through the UK from/ to Heathrow and other ports. West London will play a role in contributing to these UK-wide targets with its clustering of climate change and clean tech expertise and innovation, including Imperial College's establishment of a climate change innovation centre at its White City campus and low-carbon technology and manufacturing enterprises.

Central to achieving and delivering on renewable energy, low carbon and Net Zero goals is the need for collaboration and integration across local authority boundaries. The energy challenges, needs and priorities associated with future strategic development plans in West London are shared by all local authorities in the area.

Specific recommendations include the following.

Recommendation E1.1: A Joint Energy and Delivery Strategy, focused on the Net Zero agenda, should be developed across West London authorities. This should cover strategy and frameworks for decentralised energy, to support moves away from combined heat and power networks (CHPs) and alternative provisions. This should include:

- Integration with an Electric Vehicle strategy (Recommendation T4.1). Such as assessments of the ability of the local electricity supply infrastructure to support expanded use of electric vehicles, coordinating with District Network Operators (DNOs) and National Grid.
- Alternative energy sources including renewable heat from ground source heat pumps, air pumps and on-site renewable generation such as solar rooftop PV arrays and thermal reservoirs. Secondary heat sources including utilising waste heat from the underground stations and transport networks can also reduce demand on the grid and reduce carbon emissions.
- The land and investment requirements for energy centres and energy storage should be assessed, in addition to the emerging generation and distribution networks, as these represent potential risks to development.
- The relevant public sector funding streams to support delivery, including the Green Recovery Challenge Fund, should be identified.

Recommendation E1.2: A West London Heat Energy Masterplan should be produced. This will involve further analysis of the GLA heat map to explore what viable opportunities exist and how they can be furthered, with lessons learn and a common framework.

Recommendation E1.3: West London authorities should work together to develop a policy position on solar farm development, or to jointly develop and construct these, so that options can be developed and taken forward. This especially matters for areas of land and distribution that cross borough boundaries.

Recommendation E2: West London authorities should continue to progress and build on recommendations made in the West London Sustainability and Climate Change Policy Commissions' report[3]. These include:

[3] *Green City in the West: Leading the transition:* West London Sustainability and Climate Change Policy Commission, for West London Business (2018)

- **the establishment of zero emission networks** with collaboration with West London business for action plans to improve air quality focus areas;
- to analyse West London's electricity capacity and demand (current and future) and plan to deliver zero carbon electricity, which will need to consider the needs for Electric Vehicle Charging (EVCs) and excess heat sharing;
- **a West London Energy Users Group** to consider joint procurement of zero carbon energy/ electricity through centralised and distributed supply and storage; and
- support energy efficiency transformations to ensure minimum EPC ratings are met and businesses implement ESOS efficiency recommendations. The level of housing growth also provides the opportunity to ensure all new buildings are designed to be energy and resource efficient. New development should minimise energy use and facilitate the use of low and zero carbon technologies to help minimise carbon emissions and air pollutants.

For existing buildings, energy efficiency retrofit should be the focus. The GLA Climate Risk Mapping should be used to guide areas of vulnerability to urban heat effects alongside the mapping of residential fuel poverty to efficiently focus resources in retrofitting existing stock. It is recognised that retrofit is well underway across the seven West London boroughs for existing stock using available funds including the Green Homes fund. Standards could be made common across West London, and include the UK Green Building Council[4] and RE:FIT programme standards.

Recommendation E3: The WLA and West London authorities to actively support the green energy and clean tech sector given the importance of climate change issues and West London's current leading position in such enterprises and jobs[5].

Utilities

Utility infrastructure proposals have been identified (Section 5.2.1). The proposals may themselves reflect a local strategic impact of steps critical to growth site delivery. However effective approaches to utility planning and delivery suits a West London and strategic level response. This includes developing an understanding of local water supply issues, collaboration in water supply and wastewater and drainage and the importance of understanding and responding to the regulatory framework in planning for utilities.

Water supply

Recommendation U1: The WLA should consult on the water companies' next Water Resource Management Plans (WRMPs) due in 2022. The WRMPs will take into greater consideration the water needs of industry and the environment, as well as homes and businesses[6].

Recommendation U2: The WLA and West London authorities to actively engage with the Mayor's Water Advisory Group (WAG) group going forward. The Mayor has convened the WAG to advise on the water challenges and opportunities of London's growth[13]. The WAG is made up of senior representatives from London's four water companies, water regulators, consumer champions and other water sector experts[14]. The group remit covers key water issues relevant to London including water supply, water resource and wastewater; flood risk; drainage; and water pollution issues

Recommendation U3: Local Planning Authorities should ensure developers consult with the local water company from the outset of the project to gain an understanding of local water supply and wastewater system constraints. This early engagement should also consider the potential opportunities to reduce the development's demand for potable water through the implementation of measures such as rainwater harvesting for toilet flushing, etc.

Wastewater and drainage

Recommendation U4: The WLA should coordinate a response to the water companies' first draft Drainage and Wastewater Management Plans (DWMPs) in summer 2022. These aim to improve drainage and environmental water quality with collaborative and integrated long-term

[4] *Net Zero Carbon Buildings: A Framework Definition,* UKGBC (2019)
[5] *Winning in the New Economy*, WLA (2020)
[6] *Shape your water future. Our Water Resources Management Plan 2020-2100*, Thames Water (2020)

planning by those organisations with interests and/or responsibilities relating to drainage, flooding and protection of the environment.

Utility delivery

Recommendation U5: The WLA to facilitate joint-working and a more effective approach to utility planning and delivery. This includes the need for shared understanding to respond to the regulatory framework in utility planning.

Section 6.6.5 sets out potential consequences of ineffective utility planning including development delays and missed opportunities with not utilising potential 'dig once' approaches and timely cross-sector provision. Significant benefits can be achieved through joint working between different utilities and with/through the cross-borough WLA. Pursuing a more 'bottom up' approach of promoting dialogue between planners, developers and utilities is likely to be the best way forward. The WLA and West London's local planning authorities could have an essential role to play in ensuring this bottom-up approach can be delivered.

Flood management and green infrastructure

Flood management and green infrastructure proposals have been identified (Section 5.2.1). Some of these proposals have been categorised as being of a local strategic site impact, whilst others support growth aspirations across boundaries.

Recommendation F&GI1: West London collaboration is already a key element for the sub-region's strategic flood risk management, and this could be extended to green infrastructure for cross-boundary issues and in planning and valuing assets and investment in a holistic way.

Specific recommendations are presented below.

Recommendation F&GI1.1: The WLA should promote a holistic approach to valuing the wider benefits of flood infrastructure, working with the Environment Agency, infrastructure providers and the private sector, and in determining funding cases.

It is critical that other infrastructure developments including highways, bridges, new stations and new green space consider their potential impact on flooding and their ability to help mitigate flooding even where they are not located near watercourses. A more holistic approach to flood management is required to appropriately mitigate the impacts of future growth and ensure residential and commercial sites and infrastructure assets are resilient. For example, the consideration of SuDS introduction with transport schemes through Highways England and TfL and with developments (e.g. rain gardens, green roofs) through developer requirements.

Part of this holistic approach is in identifying and valuing the wider benefits that flood infrastructure can provide. These emerging principles for flood risk strategies are currently being considered by the Environment Agency[7] and can help address funding gaps and a lack of incentives for developers and the private sector. The consideration of whole catchment areas is important and some of the emerging short, medium and long term projects will require developer, business and/or community roles in their funding and delivery.

The West London SFRA set out recommendations for boroughs at a site specific level[8]. These remain important:

- adopt a sequential approach for planning and development to identify areas that are not susceptible to flood risk impacts posed by climate change. Development should be encouraged in these identified areas to make properties more resilient to increasing flood risk;
- make space for water storage by identifying strategic locations that are required for current and future flood risk management, and safeguard this land via Local Plans;
- adopt a Catchment Based Approach to ensure recognition of catchment wide flood issues to justify the collection and use of S106 funding to investigate and develop flood alleviation schemes within the catchment the development falls within;

[7] SIDP engagement: Environment Agency HNL Sustainable Places Team (October 2020)
[8] *West London Strategic Flood Risk Assessment*, - *Section 5*, WLA (2018)

- set up mechanisms to enable the use of CIL charges to be used for flood alleviation schemes across the Boroughs to address the cumulative impact of development on flood risk; and
- use Local Plans to ensure developments within Critical Drainage Areas (as defined by Surface Water Management Plans) provide increased surface water drainage requirements, such as increased storage through the use of SuDS to restrict off-site runoff rates to greenfield (or lower) conditions.

Recommendation F&GI2: The multiple benefits and linkages of strategic Green Infrastructure should be valued.

The value of West London's green and blue infrastructure covers a range of benefits including increased property prices, improved physical and mental health, recreational value, temperature regulation and carbon storage, water quality and biodiversity. This value will increase with climate change impacts, bringing increased risk of extreme weather to London including heavy rainfall, heatwaves and water rising increasing flooding, water drought and risks to the resilience of infrastructure assets and networks.

Climate risk maps analyse climate exposure and vulnerability across Greater London[9]. These maps can help the WLA, the Boroughs and organisations deliver equitable responses to the impacts of climate change and target resources. The climate vulnerability mapping identified people's exposure to climate impacts of flooding and heatwaves, as well as the personal and social factors that affect resilience in the ability to cope with and respond to extreme events. High climate risk often coincides with areas of income and health inequalities.

Open spaces within development should be designed to accommodate flood waters, such as the Green Grid concept with small wetlands, ponds, ditches, swales and woodlands to improve flood risk management. These also bring other benefits such as increased biodiversity, improved water quality, amenity and access to watercourses. There are clear integration opportunities with green infrastructure for flood management.

Green infrastructure further supports reduction in excess heat and the urban heat island effect. Extensive built up areas absorb and retain heat during the day and night leading to parts of London being several degrees warmer than the surrounding area, causing issues on the hottest days of the year impacting those with health conditions in particular. This urban heat island effect has been identified as a key risk for London and areas of West London with high vulnerability to these effects including Hammersmith and Fulham, Central and South Brent, the OOC/ Park Royal area, the A5 corridor, Harrow Town Centre, Southall, Hayes and Hounslow West[10]. Green infrastructure can mitigate this effect by shading roof surfaces, providing permeable surfaces and through evapotranspiration alongside more effective building orientation and measures concerning glazing, roofing, ventilation and material use.

Alternative forms like these, linked roof gardens and the greening of streets converted as shared space will be required to meet greening targets, as well as an effective delivery approach at the West London level given the scale of planned growth. Green infrastructure is also significant in enabling active mode travel and reducing severance to support wider decarbonisation. The identified green infrastructure needs include active travel and flood management elements, captured in Section 4.6.5.

The Opportunity Areas and strategic growth sites provide a critical opportunity to make a step change through development plans and in ensuring new population areas have high quality access to significant space and joined-up green corridors. Further, the Covid-19 pandemic has emphasised the value and need for accessible green space for all residents.

Recommendation F&GI2.1: WLA and West London authority collaboration should include mapping of the sub-region's green assets and the development of a valuation of this space using Natural Capital accounting approaches. This collaboration can support the case for investment for green infrastructure proposals and these cases will be enhanced where they provide corridor and active travel opportunities.

West London collaboration is important to take forward previous green corridor proposals in the All London Green Grid action areas. Some of these proposals remain strategic needs for the sub-region,

[9] *Climate Risk Mapping*, Bloomberg Associates in collaboration with the Greater London Authority (2020). https://data.london.gov.uk/dataset/climate-risk-mapping
[10] Ibid.

as set out in Section 4.6.5, and could include examining the case for a regional park in the Brent Valley and North East Barnet.

Digital

Engagement with the digital market emphasised that there is a clear opportunity for West London to utilise its role as a significant economic centre with a large population to build engagement and relationships with market operators as part of a digital infrastructure strategy. This strategy can be shaped by the West London Boroughs to realise the area's pertinent opportunities over the next 10-20 years, across identified use cases and in enabling digital delivery within Opportunity Areas.

There is an opportunity for West London to develop innovative growth sectors with private sector, higher education and research partners, where digital provision and innovation is a critical component. This could be well integrated with the West London Build and Recover Taskforce.

Recommendation D1: West London to consider commitment to providing 100% full fibre and 100% 5G coverage more quickly than central government targets (2025 and 2027 respectively). This would send a signal West London is acting as a leader in the UK digital economic recovery. This should also be complemented with a cross-boundary commitment to digital inclusion.

Recommendation D2: West London collaboration should continue with public and private sector consumers and collaborators to drive a stronger case for investment from the market.

Recommendation D3: Digital provision best practice approaches should be developed and implemented. Best practice approaches have been set out to address challenges with digital provision and deliver innovation through infrastructure and asset use (Section 4.7.2.4).

Social Infrastructure

The SIDP has considered social infrastructure from a West London strategic perspective. The current challenges in the health sector and the complex, and generally shorter-term, planning and funding landscape for health and education are recognised. Engagement with health providers and a representative range of education providers has been limited during the SIDP development, reflecting the pressures of the current situation.

West London hosts numerous University campuses, colleges, accelerators and hubs that are strategic assets and draw in investment and talent. These assets also provide innovation across key areas including digital and climate change adaptation. This would be beneficially included in sub-region collaborative work on the infrastructure response to growth, future proofing approaches and actively supporting the clean tech sector growth and innovation in other fields.

Higher education facilities may face difficulties with a drop in enrolments and accommodation take-up following Covid-19, impacting both their financial positions and reducing a key driver of local spend through student presence. A collaborative approach to potential responses could be considered including sustainable transport access to these facilities.

Recommendation SI1: The WLA and West London authorities should continue collaboration on social infrastructure, especially health, from the sub-regional perspective. There have been particular difficulties of engaging with health during the SIDP, where engagement should be continued going forward and include understanding of a) social infrastructure provision and plans going forward, and b) areas for integration with other infrastructure types, including sustainable travel access and energy strategies to reduce emissions and ensure resilience.

Recommendation SI2: Education and health destinations should be integrated into the provision of local transport schemes. This should include any West London cycling network and sustainable public transport, including express bus services, where user demand can be modelled and service and facility needs assessed. This will require collaboration across the West London boroughs and their social infrastructure providers. Specific proposals have been set out in Section 4.8.

Recommendation SI3: The WLA and West London authorities should engage with higher education and health providers in developing the priority digital use cases. This will be part of the West London digital strategy and with private sector providers and innovators.

Recommendation SI4: West London authorities should work together to provide Special Education Needs and Disability education provision (SEND). SEND as is a specialist, cross-boundary and often expensive provision area and is not strategically planned at present across West

London (formally at least). As knowledge of current and future user needs develops, this could be incorporated into a pan-West London approach, including appropriate engagement and collaboration with local authorities beyond the West London area.

Next steps

The SIDP provides a set of strategic infrastructure needs and opportunities by sector. These have been categorised to identify the most essential strategically significant projects at the West London level, recognising their development and spatial impact.

The strategic recommendations provided here highlight areas that require collaboration at the West London level to effectively drive forward opportunities in low carbon transport to meet Net Zero goals; in low carbon energy generation, distribution and storage; and the provision of climate resilient flood management and green infrastructure.

The strategically significant infrastructure proposals have been indicatively scored across the categorisation factors. High scoring West London level proposals can be considered in a timeline to 2040 in relation to their development impacts and the delivery timelines of the associated growth areas.

This outline delivery timeline will be a supporting action alongside the recommended West London collaboration for:

- Monitoring and sharing lessons on the emerging and changing implications of the Covid-19 pandemic on infrastructure demand
- Establishing clear evidence of need and economic impacts of strategic transport investment in the area.
- Maximising the WLO opportunity and promoting wider access, with station masterplans and transport network integration.
- Phasing delivery of an effective West London strategic cycling network, with a strategy covering sub-region and local use priorities.
- Developing an effective planning and delivery approach for EV infrastructure, which will need to be updated as the technology and sector changes
- Supporting and challenging transformative approaches for West London's logistics sector.
- Developing a West London Energy and Delivery Strategy.
- Developing a West London Heat Energy Masterplan.
- Developing a position on solar power generation.
- Employing best practice standards for building energy efficiency, water re-use and flood protection.
- Ensuring developers consult with utility providers from the outset of the project to understand system constraints.
- Developing a more effective approach to utility planning and delivery, with shared understanding on the regulatory framework.
- Identifying and valuing green infrastructure and flood assets.
- Taking forward digital use cases for investment.
- Employing consistent standards to digital infrastructure provision and asset use.
- Integrating the needs of the health and education sector with other West London infrastructure needs and opportunity

The SIDP sets out the relevant funding and delivery mechanisms (Section 6). An important next step will be to align those that have potential for each of the strategically significant proposals. Early criteria scoring of these mechanisms could be undertaken in advance of developing the case for investment and funding strategy of interventions.

1. Introduction

1.1. Purpose

This report is a Strategic Infrastructure Delivery Plan (SIDP) for the seven London Boroughs that form the West London Alliance (WLA) – Barnet, Brent, Ealing, Hammersmith and Fulham, Harrow, Hillingdon and Hounslow, as well as the Old Oak and Park Royal Development Corporation (OPDC) as the Local Planning Authority for the 650 hectare site.

Throughout the SIDP, the seven London Boroughs and OPDC as the West London SIDP Study Area are simply referred to as 'West London'.

The purpose of the SIDP is to provide information on future strategic infrastructure requirements. These requirements are those that are deemed critical to enabling planned housing and commercial space growth within West London, as well as potential increments over and above the baseline, in line with strategic policy objectives.

The SIDP has been created in the context of significant expectant growth and sets out a series of ambitious recommendations and potential projects. The realisation of these will inevitably be subject to resourcing, prioritisation and evolving circumstances. It will also require all infrastructure providers to work proactively with local authorities to ensure their needs are understood and improvements in provision can be realised.

The key aims of the West London SIDP are to:

- Identify the strategic physical and social infrastructure required to support the sustainable delivery of the planned development in ways that help deliver strategic policy objectives.
- Assess the existing strategic infrastructure capacity, with regard to current and future investment plans, and determine the lead organisations in planning, delivering, funding and managing that infrastructure. Where possible, identify already allocated or committed funding and any potential funding gaps.
- Identify additional infrastructure or improvements to current provision that may be necessary to deal with the anticipated consequences of climate change and mitigate the extent of further change.
- Assess the emerging strategic infrastructure needs, beyond that which is already committed and/or funded, *as* the next phase of infrastructure priorities to support West London's sustainable growth to the 2040s and beyond.
- Identify possible barriers to delivery including financing, regulatory and key agency capacity. Provide advice on areas where further work and lobbying by WLA and member boroughs has the potential to overcome these.
- Identify potential delivery mechanisms for the key infrastructure projects, in order to focus resources towards the projects deemed most important for supporting growth.
- Support the WLA in collaborating with other organisations and government departments in delivering these strategic infrastructure requirements.

1.2. West London Alliance

The West London Alliance (WLA) represents seven London boroughs: Barnet, Brent, Ealing, Hammersmith and Fulham, Harrow, Hillingdon and Hounslow.

The WLA's programme of work is shaped around the key priorities for West London boroughs. In the WLA Growth Strategy Paper, six themes were presented which coincide with the following priorities[11]

- Social and economic inclusion, ensuring people across every community and neighbourhood can benefit and thrive

[11] *Winning in the New Economy - Ensuring a Sustainable and Inclusive West London Economy (February 2020),* WLA

- Sustainability and the circular economy, a central component of any future growth plan and a sector that is already well developed in West London
- Data and digital innovation, by improving policy monitoring through data use, and supporting digital business clusters and education institutions to develop the digital sector
- Global connectivity, benefiting from West London's geographic position
- Work and productivity, working in partnership with businesses to develop tailored strategies
- Growing sectors, such as creative industries, clean tech, logistics, construction, hospitality, education and research and health and care
- Devolution, making the case for more devolution of powers and finance

More recently in response to the Covid-19 pandemic, the WLA have established a new Economic Recovery Task Force with senior representatives from private, public and voluntary sector organisations. The Task Force will help to shape and deliver the 'Build and Recover – An Economic Recovery Strategy for West London'. This strategy focuses on seven key themes: growth sectors; aviation communities; skills and employment; entrepreneurs and micro businesses; a green recovery; town centres; and housing and infrastructure.

These themes will play a critical role in driving recovery in West London and establishing a low-carbon and inclusive approach to growth, recognising both West London's vulnerable places and communities, and its unique elements. Revitalising local places and supporting West London's growth sectors will require targeted infrastructure delivery.

The West London context is set out in Section 2.3.

1.3. Definition of Strategic Infrastructure

Strategic infrastructure for this SIDP is assumed to be that which is categorised as either essential, required, important or supportive to West London's housing and employment growth to 2040 and beyond, with a focus on West London's strategic growth sites. These categories reflect varying degrees of necessity to make development acceptable in planning terms.

The assessment of necessity and infrastructure prioritisation considers its role in being essential for development, where development cannot physically happen otherwise; required in unlocking or enabling strategic growth areas, potentially earlier or to a larger scale; important in mitigating the impacts of growth; and/ or supporting the creation of sustainable communities and quality of place.

Strategic infrastructure is considered to be at least cross-boundary in nature, where it may be assessed significant for the West London and/or metropolitan/ regional scale in its spatial impact and in supporting the growth of these geographic areas.

The SIDP has also taken account of the decision by a number of West London boroughs to declare a climate emergency or otherwise highlight climate change as a key policy priority.

The SIDP has employed an infrastructure categorisation approach which reflects these defining elements.

The SIDP covers the following infrastructure sectors:

- Transport – roads, highways; bus, rail, underground; active mode
- Utilities – electricity, gas
- Water management and flood mitigation
- Digital
- Green Infrastructure (including blue infrastructure)
- Education and health from a strategic view

Note that waste has not been included as this will be covered by the forthcoming West London Waste Plan. Other types of infrastructure highlighted within Paragraph 5.1.1 of the new London Plan 2021 and Paragraph 20 of the National Planning Policy Framework (2019) will be dealt with through local infrastructure needs assessments.

Strategic growth sites for this SIDP have been defined as those which are designated as Opportunity Areas by the new London Plan 2021, these contain capacity for at least 5,000 net additional jobs or 5,000 net additional homes or a combination of the two.

Other strategic sites/ clusters (outside Opportunity Areas) are those which include proposals provide at least 250 housing units or 5,000 sqm of commercial space. The SIDP defines these strategic sites in Section 3.5.

It is recognised that the identified locations for large-scale housing and employment growth are likely to see the most rapid growth, however strategic infrastructure supporting these areas will also support the areas between.

1.4. SIDP relationship with other strategies

The following table provides a summary of the contextual strategies and plans of relevance to the SIDP, at a sub-regional or London-wide level. This is not an exhaustive list and a large number of documents have been consulted at the local, West London, London and regional levels, to inform the SIDP growth, infrastructure baseline and infrastructure needs assessment. These are referenced throughout the report.

Table 1-1 – Relevant strategies and plans for the SIDP

Transport	Energy	Water; flood	Green Infrastructure	Digital	Strategic
Keep West London Moving, 2018 West London transport infrastructure and constraints evidence, 2016 West London Orbital: Economic Development Narrative, 2020 WLO Stage 1 Option Assessment Report, 2020	West London Sustainability Climate Change Policy Commission, 2018 Climate Emergency declarations and strategies 2019-	West London Strategic Flood Risk Assessment, 2018	ALGG Action Areas, 2012- All London Green Grid (ALGG) Planning Guidance	Keep West London Moving, 2018 WLA Digital Programme and emerging Strategy	Winning in the New Economy, WLA 2020 Economic Taskforce, WLA 2020
TfL Sub-regional Transport Plan, 2016 Mayor Transport Strategy, 2018 Future Transport Report, GLA 2018 TfL London Report, 2019	London Environment Strategy, 2018 Emerging London Energy Plan Climate Risk Mapping, GLA	Thames Water and Affinity Water – Water Resources Management Plan London Sustainable Drainage Action Plan, 2016 London Regional Flood Risk Appraisal, 2018	Green Infrastructure Task Force Report, 2015 Enabling Infrastructure 2050, 2016	Smarter London Together, GLA 2018 Future Telecoms Infrastructure Review, DCMS 2018	London Plan 2021 London Infrastructure Plan 2050, GLA, 2016 National Infrastructure Assessment, NIC 2018

1.5. Approach

The SIDP approach is composed of three broad phrases to assess the strategic infrastructure needs and determining a Delivery Plan to deliver on these needs for the West London Alliance. These are demonstrated in Figure 1-1 below.

Phase 1 is composed of the supply and demand assessments:

A) The supply assessment considers the existing infrastructure and future baseline assessment incorporating planned projects. This has been determined by evidence gathered from borough, West London and London/ regional strategies and plans alongside engagement.

B) The demand assessment brings together the drivers of growth, as the projected population and employment growth (to 2040) and housing targets (to 2040) and at a strategic growth level with a focus on Opportunity Areas for West London. The spatial and growth capacity elements have been considered and in relation to the infrastructure baseline.

Phase 2 brings together the Phase 1 components to assess infrastructure needs for West London's strategic growth areas. This considers the gap from the existing provision and pipeline to the strategic growth needs, focussed on the strategic growth sites and in addressing identified challenges and meeting strategic priorities.

This is undertaken for each sector in turn. It is recognised that these assessments for social infrastructure section are more limited in their depth and extent. There have been challenges in effectively engaging with the health sector during the SIDP development (particularly given the impact of Covid-19) and a representative range of education providers. Further, the planning and funding framework for these sectors is complex and less well aligned with the SIDP timeline. However, strategic infrastructure needs have been drawn out for education and health provision (and the interfaces between these and other infrastructure types) as was possible at this stage.

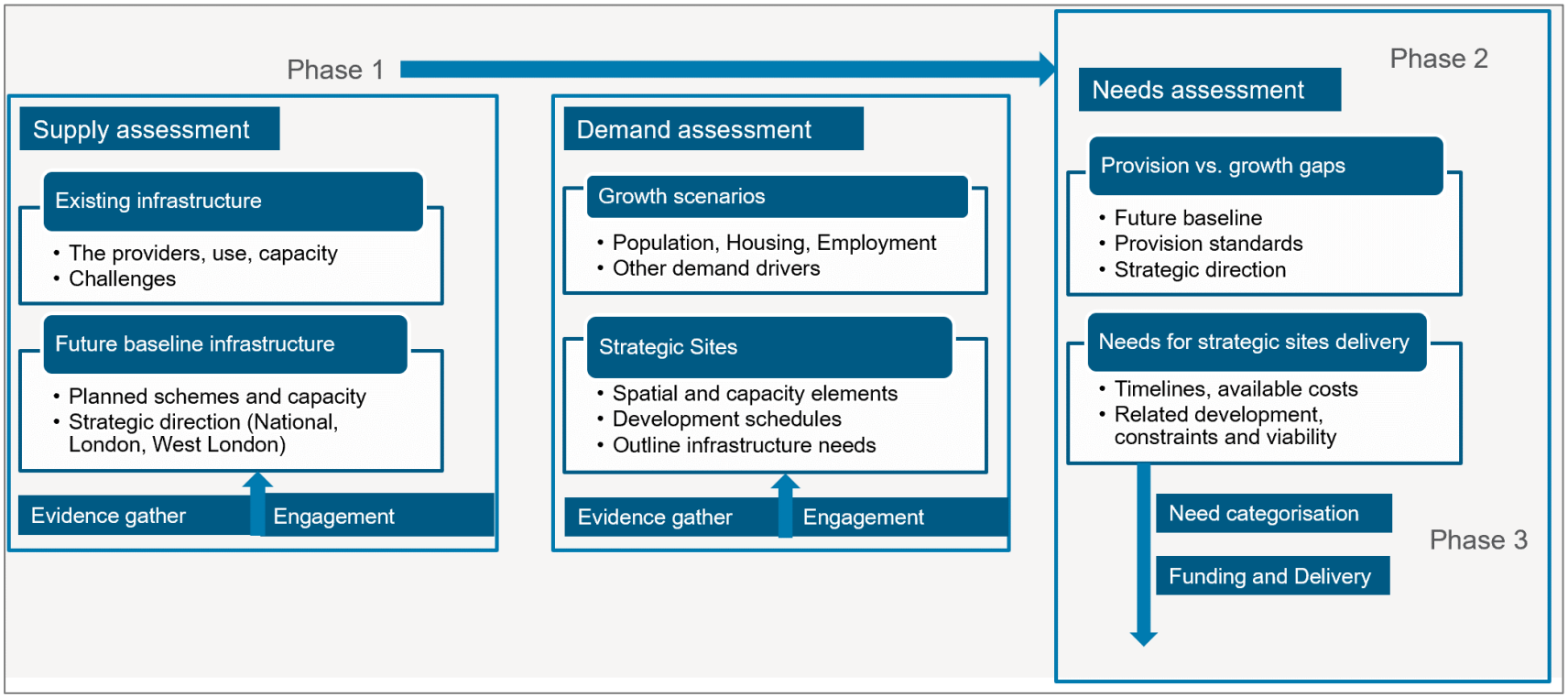
Phase 3 takes forward the assessed infrastructure needs to consider the timeline and cost requirements for the emerging infrastructure projects through available information, engagement and high-level estimates as required.

The SIDP does not provide cost estimates for all infrastructure needs and in turn an overall total cost scale. Some of the identified needs require defining as projects or remain at early stages of this process, with large uncertainties for their cost scales. Given the scope and scale of this commission, the SIDP does not seek to address these gaps. However, the information presented here gives an indication of the likely scale of resources that will be required and provides a basis for more detailed costing work as plans are developed further.

A categorisation exercise is undertaken for the identified infrastructure needs considering their criticality to development, the development scale that is enabled/supported and the geographic reach of the infrastructure (site, local, West London or metropolitan). This process identifies the most essential strategically significant projects at the West London level in terms of what is required to support growth and development. The purpose is not to prioritise between different infrastructure types but rather the over-riding degree of need for projects. Investment required in different infrastructure sectors, where there are interactions between these, and infrastructure sectors and projects have different spatial levels of impact and requirement for a cross-borough, West London delivery approach.

The relevant funding mechanisms and delivery approaches are then considered for these priority and strategic needs, in ways that can realise cross-sector and cross-boundary benefits.

Figure 1-1 – SIDP Approach



1.6. Engagement

Engagement has been a crucial element of the SIDP. Firstly, in identifying the current provision and challenges for infrastructure in West London alongside the relevant strategic priorities. Engagement has identified schemes which are already planned or in the pipeline for West London. Further infrastructure requirements to meet challenges, growth and strategic priorities have been identified alongside identified potential schemes have been informed with engagement.

Engagement has included:

- Local Planning Authorities and their sector specialists;
- WestTrans;
- Infrastructure providers and operators including TfL, Network Rail, energy companies, water companies and digital providers;
- National Grid;
- Environment Agency;
- Social infrastructure providers for Higher Education and health; and
- Business perspectives as Capital West London and West London Business.

The authors of the SIDP extend our grateful thanks for all contributions received.

Appendix B sets out the stakeholders that have been engaged for the SIDP.

1.7. Section outline

The remainder of the report is structured as follows:

- **Section 2: 'Context'** provides an overview for the growth, infrastructure and property market trends for London, West London and the Boroughs, as well as the strategic policy context.
- **Section 3: 'Growth and Demand Drivers'** provides projections and targets for population, housing and employment, and sets out the strategic sites for the SIDP.
- **Section 4: 'Strategic Infrastructure Baseline and Needs'** is structured by each infrastructure sector in turn and provides the:
    - Baseline – strategic priorities and current provision and challenges for West London's infrastructure, by sector, and identified planned infrastructure as the future baseline.
    - Needs – the infrastructure needs as schemes and opportunities to support West London's strategic growth and address the identified challenges.
- **Section 5: 'Infrastructure Need Categorisation'** takes the identified infrastructure needs and assesses their priority status and site impact at the West London strategic level.
- **Section 6: 'Funding and delivery'** sets out the potential funding approaches and delivery mechanisms to realise the priority infrastructure needs.

2. Context

This section sets out the SIDP context, covering: the national policy; the London strategic policy for development; West London growth and infrastructure trends; and borough level strategic planning.

2.1. National policy context

The importance of robust infrastructure planning and response to climate change is emphasised in the NPPF (February 2019) with statements covering:

Strategic development:

- Para 20) Strategic policies should set out an overall strategy for the pattern, scale and quality of development, and make sufficient provision for:
    - a) housing (including affordable housing), employment, retail, leisure and other commercial development;
    - b) infrastructure for transport, telecommunications, security, waste management, water supply, wastewater, flood risk and coastal change management, and the provision of minerals and energy (including heat);
    - c) community facilities (such as health, education and cultural infrastructure); and
    - d) conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation.
- 22) Strategic policies should look ahead over a minimum 15 year period from adoption, to anticipate and respond to long-term requirements and opportunities, such as those arising from major improvements in infrastructure.

Effective collaboration:

- 26) Effective and on-going joint working between strategic policy-making authorities and relevant bodies is integral to the production of a positively prepared and justified strategy. In particular, joint working should help to determine where additional infrastructure is necessary, and whether development needs that cannot be met wholly within a particular plan area could be met elsewhere.

Sustainable transport:

- 90) Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:
    - a) the potential impacts of development on transport networks can be addressed;
    - b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;
    - c) opportunities to promote walking, cycling and public transport use are identified and pursued;
    - d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and
    - e) patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places
- 91) The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health.

High quality communications:

- Advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. Planning policies and decisions should support the expansion of electronic communications networks, including next generation mobile technology (such as 5G) and full fibre broadband connections.

Climate change and flooding:

- 148) The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.
- 151) To help increase the use and supply of renewable and low carbon energy and heat, plans should:
    - a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
    - b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
    - c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

The natural environment:

- 171) take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.

This provides a framework for the consideration and assessment of strategic infrastructure needs and to reflect this in planning and delivering strategic development.

2.2. London

2.2.1. Strategic policy for development

The SIDP refers in the main to the new London Plan (March2021)– referred to throughout this document as "**the London Plan'.** It is important to note that the new London Plan was not yet adopted in earlier phases of this work including engagement exercises however the SIDP reflects the new London Plan as far as is possible.

London's strategic development planning is centred on area designations, the foremost of these being Opportunity Areas where 48 are identified in the London Plan (11 of which are in West London) . These are significant locations with development capacity to accommodate new housing, commercial development and infrastructure, linked to existing or potential improvements in public transport connectivity and capacity. Opportunity Areas typically contain capacity for at least 5,000 net additional jobs or 2,500 net additional homes or a combination of the two.

Identified growth corridors in the London Plan are present in West London due to the developing transport links. The Growth Corridors represent linkages between the Opportunity Areas, which should not be planned in isolation. The following are the relevant Growth Corridors and Opportunity Areas, which are detailed further in Section 3.4:

Table 2-1 – London Plan Growth Corridors and Opportunity Areas

Heathrow / Elizabeth Line West	High Speed 2 / Thameslink Growth Corridor
Hayes	Harrow and Wealdstone
Southall	Wembley

White City	Colindale/ Burnt Oak
Earls Court/ West Kensington	Brent Cross/ Cricklewood
Great West Corridor	Old Oak/ Park Royal
Old Oak/ Park Royal	
Heathrow*	

**Heathrow OA is now unconfirmed, though the SIDP considers the LB Hounslow decision to take forward its section of the boundary as 'West of Hounslow' as set out in the Draft Submission West of Borough Local Plan Review*

The London Plan Policy SD1 states that to ensure Opportunity Areas realise their growth and regeneration potential the Mayor will:

- provide support and leadership for the collaborative preparation and implementation of planning frameworks;
- bring together the range of investment and intervention needed to deliver the vision and ambition for the area;
- support and implement adopted planning frameworks, in order to give them appropriate material weight in planning decisions;
- ensure that his agencies (including Transport for London) work together and with others to promote and champion Opportunity Areas, and identify those that require public investment and intervention to achieve their growth potential;
- ensure that Opportunity Areas maximise the delivery of affordable housing and create mixed and inclusive communities;
- ensure that Opportunity Areas contribute to regeneration objectives by tackling spatial inequalities and environmental, economic and social barriers that affect the lives of people in the area, especially in Local and Strategic Areas for Regeneration;
- monitor progress in delivering homes, jobs and infrastructure, taking action where necessary to overcome any barriers to delivery; and
- ensure that development facilitates ambitious transport mode share targets.

Policy SD1 sets out the role for Boroughs, through Development Plans and decisions, that includes the following:

- clearly set out how they will encourage and deliver the growth potential of Opportunity Areas, establishing the capacity for growth, taking account of the indicative capacity for homes and jobs in the London Plan;
- plan for and provide the necessary social and other infrastructure to sustain growth and create mixed and inclusive communities, working with infrastructure providers where necessary;
- support and sustain Strategic Industrial Locations (SIL) and other industrial capacity by considering opportunities to intensify and make more efficient use of land in SIL;
- include ambitious transport mode share targets; and
- support wider regeneration and ensure that development proposals integrate into the surrounding areas.

In the years since designation, it has principally been the responsibility of Local Planning Authorities to progress any planning frameworks, investment plans, or spatial interventions to initiate development. Alongside significant variation in scope and scale of the various Opportunity Areas, there have been differing approaches to progressing development.

2.2.2. London growth and infrastructure trends

Socio-economic growth prospects

London has been growing fast since the late 1980s. Its economy has expanded rapidly even through cyclical downturns, progressively shifting to high-value services and financial activities. This has reinforced the capital as a strong place for trade nationally and on global markets.

Today, forecasts predict that population growth will continue over the next decades, although not at the same pace as was experienced previously. Most recent data from the GLA show that London population is projected to increase from 8.8 million in 2018 to 10.43 million in 2041 (an 18% increase), under the central trend projection. This represents an annual increase of around 70,600 new residents per year.[12] The GLA does not expect Covid-19 to have a lasting effect here[13].

London is by far the UK region with the highest productivity, with a GVA per hour worked 33% higher than the national average.[14] High levels of productivity (due to various factors such as workers' skillsets, transport infrastructure and knowledge spill-overs) are attractive to firms and businesses in several sectors and are likely to explain, at least partly, employment growth in the capital's growth sectors. In the last decade the number of jobs in London has grown by around one million, significantly faster than the rest of the country.

However, real earnings growth has been low – due to high consumer prices and housing costs. Employment in London is projected to grow by an average of 49,000 jobs a year between 2016 and 2041.[15]

Housing and infrastructure trends

Housing is of particular importance in the case of London, where housebuilding has not been able to keep up with growth, leading to housing shortages and high costs. Between 1996 and 2016 the number of homes increased by only 16% in London – compared to a job growth of 44% and population growth of 26% over the same period.[16]

This has led to housing being particularly inaccessible to Londoners: the average house in London was worth 15.8 times Londoners' average wage in 2019, compared to just 9.4 times nationally, making London the second least affordable city in the UK after Oxford.[17] This might partly explain why population growth has slowed down more recently. In particular, the GLA projects domestic out-migration to outnumber domestic in-migration, at an average rate of 82,200 people per year (although this will be over-balanced by births and international in-migrations).

The GLA estimates the net requirement for new homes in London to be around 65,900 homes a year between 2016 and 2041. Of this, 47% would need to be 'low cost rent' and 18% intermediate (such as shared ownership) based on standard affordability tests. The National Housing Need Methodology estimates a higher annual homes requirement (93,500).

To support this growth, investment in key infrastructure is essential.

In addition to this, there is recognition of the importance of London in the wider regional and national economy. In 2011, 21% of those working in London lived in another region – including 11% in the South East and 8% in the East. Those strong commuting patterns means that parts of these regions' economies are significantly reliant on London's growth and infrastructure. The consequence is that London's infrastructure, specifically transport infrastructure, serves a much larger pool of workers and travellers. The legacy of Covid-19 may include a shift away from the previous quantity and patterns of in-commuting, particularly to central London, whilst local connectivity may become more important in enabling people to access more local employment bases.

Reducing car use is a priority with the ambition to make walking, cycling and public transport represent 80% of all trips in 2041 (or 33 million daily trips), compared to 63% in 2015. Mass transport investments will be a key part of this shift, including the Elizabeth Line, HS2 (through Old Oak Common) and the ambitions to develop Crossrail 2, which would connect Surrey and Hertfordshire through London and provide an estimated capacity increase of 270,000 people daily. Additionally, there are plans to improve the frequency and reliability of existing suburban rail services to levels similar to the Overground Network, creating what is sometimes referred to as a London suburban metro. From a planning perspective, better accessibility to transport infrastructure is encouraged and this should guide local authorities' development plans and master-planning strategies. Walking and

[12] *2018-based trend projection results,* GLA Intelligence (November 2019)
[13] *GLA Demographic Expert Panel Report* (2020)
[14] *Regional and sub-regional productivity in the UK*, ONS (2019). Accessed at: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/regionalandsubregionalproductivityintheuk/february2019#results-for-nuts1-regions-and-countries
[15] *The 2017 London Strategic Housing Market Assessment*, Greater London Authority (2017)
[16] *The 2017 London Strategic Housing Market Assessment*, Greater London Authority (2017)
[17] Centre for Cities Data tool, accessed on: https://www.centreforcities.org/data-tool/#graph=map&city=show-all

cycling have considerably increased in London, in particular thanks to new cycling infrastructure including superhighways. However, it is estimated that 5 million trips per day that could have been walked or cycled are currently done by car.

Strategic action for climate change and air quality

One of the largest international challenges that London must take part of is the fight against climate change. The Mayor of London has committed to make London a zero carbon city by 2050 – which will require specific investments and actions from the GLA, boroughs, businesses and communities. Boroughs have also declared climate emergency with strategies and action plans being released and developed[18].

The city remains reliant on fossil fuels that are a major contributor to climate change. The GLA aims to switch energy supply to cleaner, local renewable energy. Building efficiency is a further requirement by improving insulation and making heating systems more efficient through smart technology.

Air quality is a crucial factor on which cities across the globe can actively influence. As in many other large cities, air quality in London is poor – particularly along strategic roads – and several areas breach annual legal air pollution limits in just a few weeks. The impact of air quality on health is well documented with associated increases in respiratory diseases and reduced life expectancy.

Air quality is an important part of the GLA's environmental strategy, and the city has the ambition to have the best air quality of any major world city by 2050, going beyond the legal national requirements. London has already introduced an ultra-low emission zone (ULEZ) in 2019 to deter the most polluting vehicles from entering the city, which is proposed to be extended. Traffic is not the only cause of poor air quality. Around half of emissions do not come from the road and could be caused by construction, wood and gas burning for heating and power. These also need to be addressed to ensure the meeting of targets.

Some of the actions and targets that have been set up to address climate change include[19,20]:

Table 2-2 – London strategic actions for climate change

Target area	Detail, commitments
Energy use Shift to a more respectful energy mix, with 15% of energy demand met by renewable and district energy by 2030, and a city-wide deployment of low carbon heating systems during the 2030s. Improve efficiency of all homes and public buildings	GLA 2017 plan that by 2019 all new buildings would be zero carbon, and that by 2020 every home has a smart meter. GLA investments in efficiency building retrofits, so that by 2030, 70% of all buildings have achieved adequate energy efficiency performance (EPC C or above) compared to just 35% in 2017 Increase the number of homes and businesses connected to communal heat networks that use local energy source Increase solar capacity by providing grants to community groups and putting solar panels on TfL buildings Trial low carbon technologies like heat pumps and batteries
Transport energy use Phase out fossil fuel in public transport with the aim to make the whole system zero emission by 2050	Reduce car use and encourage the switch to cleaner fuels Make the whole bus fleet zero emission by 2037 Support shifts to active mode provision through safe, accessible and attractive routes
Green infrastructure Protect and enhance assets for a network and All London Green Grid	Preserve existing and develop new green infrastructure, including parks, greener streets, greener buildings (with green roofs, sustainable drainage systems, etc.).

[18] LB Hounslow *Climate Emergency Action Plan* (January 2020), LB Harrow *Climate Change Strategy* 2019-24 (January 2019), LB Ealing *Draft Climate and Ecological Emergency Strategy* (September 2020) set for publication in December 2020.
[19] *London Environment Strategy*, Greater London Authority (2018)
[20] *Zero carbon London: a 1.5ºC compatible plan*, Greater London Authority (2018)

Waste management Move to circular economy approach	Improve waste management by setting minimum recycling standards for London's waste authorities by 2020 and help cut food and packaging waste by 50% to 2030.
Air quality Address problem areas and provide monitoring and feedback	Better monitor air quality and provide information on when air pollution is bad Develop new quality standards for new buildings so they contribute to cleaning London's air, with an Air Quality Positive standard to new building developments. Use the planning system to ensure buildings used by vulnerable people are not located in areas of poor health quality. For instance, 20% of primary schools are currently located in parts of London that breach legal limits.

Smart city

Some of these objectives will not be achieved without the wider user of data and "smart" technologies. Issues from rising population growth and climate change can be managed through information and communication technologies (ICTs), with the management of big data. A Smart sustainable city can be defined as an innovative city that uses ICT and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations in economic, social, environmental and cultural aspects[21].

Home smart meters are a good example of such smart technologies, but this can also include real-time data on transport congestion, public transport usage, energy and water demand and the use of sensors and drones to monitor and manage parking, traffic and infrastructure conditions. Smart technologies can enable the adaption of demand peaks throughout the day and lead to a more efficient use of resources. Future infrastructure investments should include smart technologies to support these ambitions.

2.3. West London

2.3.1. West London growth and infrastructure trends

Overview

West London, as the WLA area, has a total population of 2,076,000, over 120,000 businesses, total employment of 963,000[22] and a combined GVA of over £80 billion, making it a larger economy than Glasgow, Leeds and Birmingham combined.

West London has a number of key assets and large employment centres, including Park Royal (the largest industrial area in London), Heathrow Airport (as the UK's largest single employment site), White City (with a significant creative and digital hub), Westfield London and Brent Cross (as large employment and retail areas). In addition, the five metropolitan town centres of Ealing, Shepherd's Bush, Harrow, Uxbridge and Hounslow concentrate large retail, office and housing space.

While West London includes some of the most affluent neighbourhoods of London, there are significant disparities between and within each borough. For instance, the median weekly earnings vary from £793 in Hammersmith and Fulham (the 7th highest median earnings in London) to just £610 in Brent (the second lowest in London). Similar disparities are visible within each borough: to continue with the same example, Hammersmith and Fulham is the 96th most deprived local authority in the country, highlighting the existence of significant pockets of deprivation. Overall, 17 neighbourhoods (LSOAs) in West London are ranked in the 10% most deprived nationally.

West London benefits from good infrastructure, in particular radial transport infrastructure, although significant shortages have been highlighted. Transport improvements are forecast from several new projects including the Elizabeth Line, High Speed 2, and a new multi-modal station at Old Oak

[21] *Smart London Plan,* GLA (2014)
[22] Business Register and Employment Survey (2018)

Common. The use of private vehicles still accounts for 43% of all journeys in West London. Further transport interventions including orbital links and sustainable travel access to local employment and commercial centres will likely be important in reducing this use, whilst low and zero emission vehicles will be critical to reduce the impact of vehicle journeys.

Sectoral and spatial drivers

Despite the scale of jobs concentrated in central London, the quantitative majority of London's employment is located outside of the city core. The health and social work, retail, and education sectors, which are more significant outside of central London, together account for more GVA than financial and insurance services. Large increases in employment in education and health sectors are projected, partly linked to population growth.

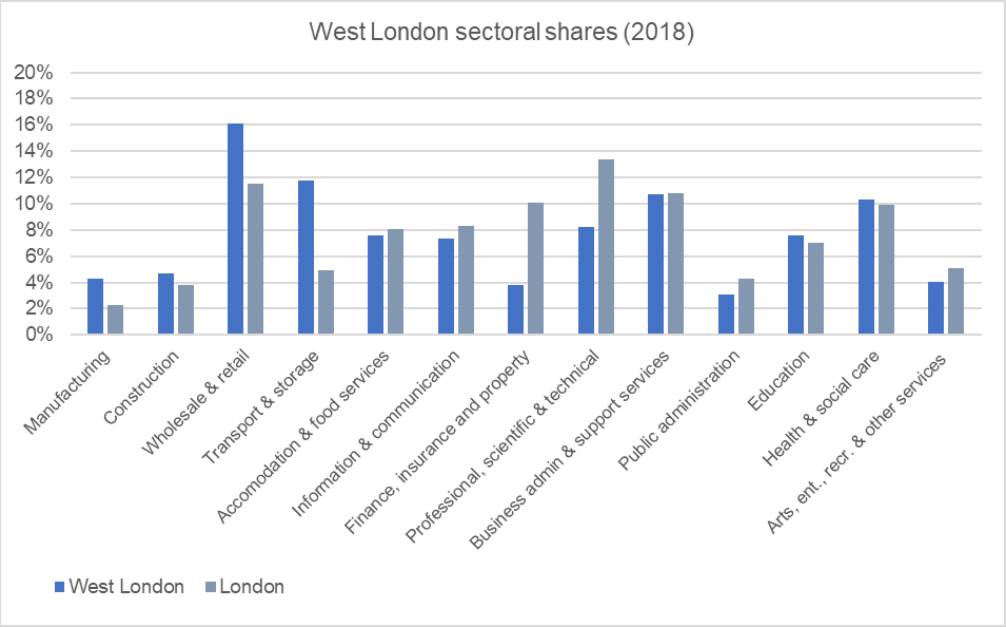
The largest sectors by employment for West London are professional, scientific and technical and administrative services (20% between them), wholesale and retail (16%), health and social care (11%) and transport and storage (12%), reflecting a diverse economy that benefits from both high-skilled, high-value industries from its proximity to central London, and from significant transport and logistic infrastructure due to its strategic position.

West London makes a particularly significant contribution to London's economic activity in the following sectors:

- Industrial: London's largest area of concentrated industrial activity as Park Royal and associated corridors around the A40 accommodating warehousing, logistics activities, and small-scale manufacturing activities[23]. Manufacturing accounts for 4% of all jobs in West London, compared to 2% in London.
- Distribution and transport: due to the presence of Heathrow Airport and nationally strategic routes, West London is a key logistics hub for London and the region. Close to 1 in 2 jobs in this industry in London (44%) are located in West London. Hounslow has the second highest concentration of transport and logistics employment in London, with around 12,000 jobs[24].
- Professional, scientific and technical – reflect 8% of jobs with knowledge and high productivity sectors across the area and key locations, as well as the presence of global IT companies. Inner West London (including Hammersmith and Fulham, Camden, Westminster and City of London) is the UK's most productive sub-region, at 50% above the UK average, and Outer West London (all six other West London boroughs) is the second highest subregion at 27% above the UK average[25].
- Creative, media and digital: with White City and the 'Great West Creatives' Enterprise Zone. There is particular concentration in Hounslow with London's highest concentration of Media and Broadcasting jobs and 14% of local employment in creative industries[26].

Figure 2-1 – Sectoral employment 2018

[23] *Industrial Land Demand*, GLA, (2017)
[24] *Great West Corridor Options Consultation*, LB Hounslow, (2017)
[25] *Regional and sub-regional productivity in the UK: February 2019,* ONS (2019) (latest data)
[26] *Great West Corridor Options Consultation*, LB Hounslow, (2017)



Source: ONS, 2018 latest employment data

The notable shares of the wholesale and retail sector in West London highlight the need for local and regional transport connectivity. Alongside the transport infrastructure needs of West London's transport and logistics sector, digital connectivity will become increasingly important in the management of goods movement and distribution. Knowledge intensive and creative sectors, with future resilience require the provision of ultra-fast broadband and 5G, which will also support emerging innovative sectors that will be key to future economic growth. Transport and logistics is also a sector of high demand for energy, where low and zero carbon innovation in this space will be critical in the meeting of climate change objectives for West London. This is also extended to the manufacturing space, with West London's key industrial locations.

The Covid-19 Impact and Legacy on West London

The Oxford Economics Covid-19 impact reports for West London[27] have highlighted particular areas of concern and areas of resilience, providing forecasts and recorded impacts on the economy and its sectors. West London GVA fell by 10.7% in 2020 (£8.1bn), higher than the UK (10%) and London as a whole (9.4%) and above the anticipated level in the first report, published in June 2020. Jobs fell by 21,600 (1.9%) in 2020 and are forecast to fall a further 27,000 (2.5% of jobs) in 2021. This 2020 jobs decline compared to 1.5% and 1.6% in the UK and London respectively, and the 2021 forecast fall in jobs is also greater in West London than London and the UK.

The areas of concern reflected the sectoral composition of West London with retail and wholesale, transport and storage and manufacturing, as well as the greater share of small and micro businesses than the London average. Heathrow plays a highly significant role where many of its workforce were also not able to work from home and the airport's recovery will have a large knock on effect through the supply chain and workers' spending.

The Oxford Economics work also raises important considerations for infrastructure and the Opportunity Areas:

- Making the economic case for West London and reassuring developers and investors is important for protecting regeneration schemes – West London's 11 Opportunity Areas – including, but not confined to, the case for transport investment.
- Recognition that a Covid-19 driven delay to OOC/Park Royal, or a scale back, would affect all parts of West London due to its scale and linkage to major transport investment. This delay or

[27] *How might coronavirus impact the West London economy?* Oxford Economics (June 2020). Updated report: *How has coronavirus impact the West London economy?* Oxford Economics (April 2021)

reduced scale could be driven by a decline in the availability of private capital, a weak recovery of Heathrow and delays or halts to HS2 through a downside scenario.

- The public transport investment needed for several of the Opportunity Areas faces difficulties with potentially severe impacts on the capacity and willingness of the private and public sector to make commitments of the scale needed.
- However, Oxford Economics rate these macroeconomic risks as small, recognising the favourable financing conditions for UK government and continued low interest rates. As such, it may be more about making the economic case to central government in a competitive landscape.
- Heathrow Airport as a key asset faces unique challenges as the UK's largest passenger and cargo hub. Passenger numbers have nosedived, and macroeconomic impacts leave a question mark over long-term investment projects.
- Digital connectivity was a key variable in Oxford Economics' Coronavirus Vulnerability Index, supporting sector resilience (and adaption) and home working.
- Higher education facilities face difficulties with a drop in enrolments and accommodation take-up, impacting both their financial positions and reducing a key driver of local spend through student presence. A collaborative approach to potential responses may be required.

Further, it is recognised the impact Covid-19 has had on the financial performance of transport operators in particular. TfL has faced significant financial issues and requires a long-term deal from Government, leaving its planned interventions and long-term strategy uncertain at this stage.

2.3.2. Borough-led strategic planning

The following table sets out the key overarching plans and strategies for each borough that have informed the SIDP, including the Local Plan with the latest status understanding. This is not an exhaustive list and a large number of documents have been consulted at the local, West London, London and national level. These are referenced throughout the report.

Table 2-3 – Borough strategic documents

Borough	Local Plan	Key relevant Documents
Barnet	2020 Draft, *currently not released for public consultation* For 2021-36	LIP3, 2019 LT Transport Strategy, 2019 Barnet Growth Strategy 2019-30 Barnet Green Infrastructure Strategy, 2017 Barnet IDP, 2021
Brent	2010 Core Strategy, 2018 Preferred Options, 2020 now approved following final stage consultation	IDP, 2019 LIP3, 2019 Inclusive Growth Strategies, 2019 Brent Digital Strategy, 2017-20
Ealing	2012 Core / Development Strategy – to 2026	LIP3, 2019 Transport Strategy, 2018 Digital Strategy, 2018 Future Ealing Borough Plan, 2018-22
Hammersmith and Fulham	Released in 2018	Draft LIP3, 2018 IDP, 2016 Industrial Strategy, 2017
Harrow	2012 Core Strategy – plan until 2026 *Holding back for London Plan finalisation*	LIP3, 2019 Strategic Environment Assessment, 2019 Infrastructure Assessment & Delivery Plan, Climate Change Strategy, 2019-24 Harrow Regeneration Strategy, 2015
Hillingdon	2012 Strategic Policies – Vision for 2026 2020 Site Allocations and Development Management Policies	SIP, 2017 LIP3, 2019 Hillingdon AQAP, 2019-24
Hounslow	2015 – plan until 2030 Opportunity Area strategic plans, to be adopted mid-2021	Draft IDP, 2020 LIP3, 2019 Future Borough Strategy, 2018-35 Climate Emergency Action Plan, 2020

OPDC	2018 second revised draft for regulation consultation. LP modifications of early 2021.	IDP2018 and 2021 update

2.3.3. Property Market

Cushman and Wakefield have conducted a strategic review of the residential and commercial property market in West London including a more detailed focus on key regeneration and growth areas, particularly designated Opportunity Areas. The full report is provided as Appendix A.

Understanding the performance of property markets across West London is important to help inform plans for future strategic infrastructure provision. This informs how the property market performance will influence the locational priorities for infrastructure investment; and the potential uplift impact infrastructure investment could have on the viability, feasibility, timing, scale and mix of development at strategic sites.

The report provides the following headlines for West London:

Residential

- Sales values are generally higher the closer the location is to Central London, with values retained more readily when moving north. The lowest values are in the south west area, predominantly in the boroughs of Hillingdon and Hounslow.
- The most significant delivery of new homes through West London is in areas of long term concerted redevelopment of strategic brownfield sites, for example, the three areas with the current highest delivery rates are White City, Wembley and the Colindale/ Burnt Oak Opportunity Area.
- The delivery of new homes – particularly at scale and pace – is more nuanced than a delivery model in the highest value areas; other drivers include land availability, land prices, and the target market.
- The housing shortage and high sales values in London has caused people to look further from central London in the search for cheaper housing. It is in these areas where land price can permit lower sales values for developers whilst maintaining a profit that adequately incentivises delivery.
- There is a clear correlation between levels of both delivery of new homes and the value of those homes and proximity to public transport infrastructure hubs (namely London Underground stations). These are the most desirable locations for purchasers, indicating that investment in transport infrastructure can help to achieve higher delivery rates or even unlock sites.

This section provided the overall context for West London infrastructure needs. The following section looks at the growth and demand drivers in more detail.

3. Growth and Demand Drivers

This section sets out the demographic, housing and employment growth scenarios for West London, before presenting the strategic growth sites considered for the SIDP. These drive infrastructure demands and provide the basis for understanding the spatial element of West London growth.

Summary

- West London is expecting significant housing and jobs growth to 2040, which will require infrastructure to support this growth whilst the climate change context brings new expectations for how this growth is supported – to protect against urban heat, flooding risk and drought and support Net Zero delivery.
- West London's population is projected to increase by 343,800 people to 2040, at a similar growth rate to London as a whole, with Brent and Hammersmith and Fulham projected to grow at a greater rate.
- There is some gap between the projected working age population and the number of jobs to 2040 in some parts of West London and in turn the sub-region as a whole. This implies a growth in commuting into and around the sub-region, highlighting the importance of transport connectivity.
- The role of digital connectivity is highlighted to support smart working through future of work trends, where remote and flexible working will increase and for particular sectors.
- The declining shares of working age population are recognised, and will drive some of the increased need for social infrastructure provision with a higher population above working age and in older age groups.
- West London has strengths in key economic sectors (logistics, high value manufacturing, and creative, media and digital) and makes a major contribution to the London and UK economy. West London is projected to have growth in several major locations within the HS2/ Thameslink and Heathrow/ Elizabeth Line West growth corridors and the Opportunity Areas' indicative jobs total 140,000.
- West London may have significant economic impacts from Covid-19 in the short-term. Jobs fell by 21,600 in 2020 and are forecast to fall by a further 27,000 jobs in 2021. Oxford Economics forecast that West London jobs will return to their 2019 level in 2023.[28].
- There is a network of key housing/ employment growth areas, though some are less well linked to existing and future anchors (workplaces, West London town centres, significant open space, transport interchanges)
- There is scope for infrastructure to be considered strategically and from a cross-boundary perspective to help West London's growth areas meet and in cases exceed their indicative housing and employment delivery. The growth areas could contribute more than the sum of their parts where their infrastructure provision has an impact beyond the area itself.

3.1. Demographics

Current and future population forms a key part of the demand assessment, determining the needs for infrastructure provision and where delivery needs to be prioritised.

The GLA housing-led population projections have been deemed to be best fitted to suit the needs of the SIDP. The projections are housing-led and based on demographic data from the Office for National Statistics (ONS) (as fertility, mortality and migration rates) and future housing data from the Strategic Housing Land Availability Assessment (SHLAA) [29]. The projections have higher growth rates than the ONS population projections and are more locally determined.

The GLA provide these population projections to 2050, from a base year of 2018, as the latest available data released in February 2020. These are presented in Table 3-1 and show a total increase

[28] *How has coronavirus impacted the West London economy?* Oxford Economics (April 2021)
[29] *GLA Housing-led projection methodology - 2018 based projections*, GLA (February 2020 release)

of 343,800 for West London. West London currently reflects 23.4% of London's population and this is projected to be largely stable to 2040 (23.5%).

Table 3-1 – GLA population projections for WLA

Borough	2020 population	2030 population projection	2040 population projection	Growth to 2040 (per annum %)
Barnet	392,500	426,000	443,400	+53,100 (0.61%)
Brent	337,600	383,700	412,500	+76,200 (0.97%)
Ealing	352,800	396,000	415,100	+63,200 (0.79%)
Hammersmith & Fulham	189,300	219,900	255,600	+68,100 (1.47%)
Harrow	253,600	268,200	276,100	+23,900 (0.43%)
Hillingdon	305,400	319,400	327,200	+24,200 (0.36%)
Hounslow	278,600	304,400	312,800	+35,100 (0.57%)
Total WLA	2,109,800	2,303,00	2,442,700	+343,800 (0.72%)
London	8,991,300	9,728,400	10,375,700	+1,443,400 (0.71%)

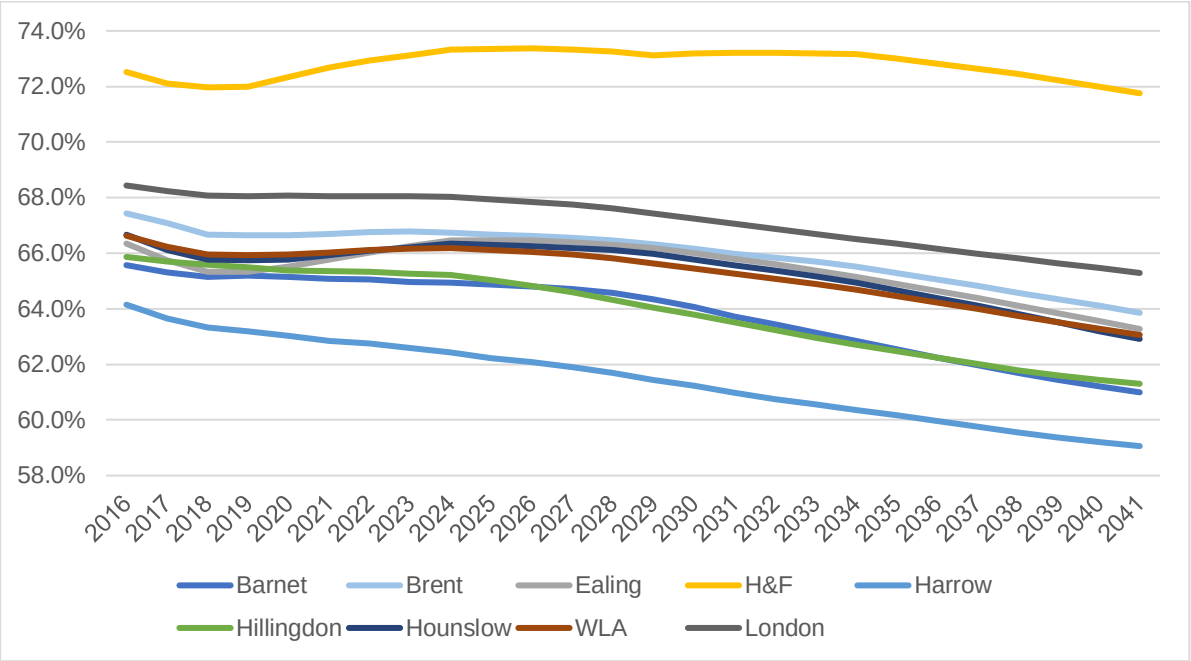
Source: GLA 2018-based projections (2020 release), nearest 100

These projections show all boroughs are projected to grow, with an average per annum growth of 0.72%, in line with London (0.71%). The projected population change from 2020 to 2040 ranges from 8 and 9% for Hillingdon and Harrow to 36% for Hammersmith and Fulham, at an average WLA period growth of 16%. Barnet has the largest population in London, with Ealing and Brent West London's next largest boroughs and the capital's fourth and sixth largest boroughs respectively.

3.1.1. Working age population

The working age (16-64) proportion of the population is projected to decrease across West London, as well as for London. In 2040, the average for the seven boroughs (63.1%) is lower than the London average (65.3%), with Hammersmith and Fulham (71.7%) the only borough to have a higher proportion than the London average. Hammersmith and Fulham does not experience a decrease in the working age share from 2020 to 2040 in initial years but has a projected downward trajectory towards the end of the period. The other six boroughs have a lower working age proportion in 2020 compared to London (85%) with further divergence forecast, as demonstrated in Figure 3-1 below.

Figure 3-1 – Projected working age shares



Source: GLA 2018-based projections (2020)

Given the projected population increases, the working age population still increases across West London, at 155,700 in absolute terms as presented in the table below.

Table 3-2 – Working Population Projection for West London

Borough	2020 Working Age	2040 Working age projection	Change	% change in working age share
Barnet	255,600	271,400	+16,100	-4.1%
Brent	225,000	264,400	+39,200	-2.8%
Ealing	231,100	263,800	+32,100	-2.2%
Hammersmith & Fulham	137,000	184,000	+47,700	-0.6%
Harrow	159,800	163,500	+4,100	-4.0%
Hillingdon	199,600	201,100	+2,400	-4.1%
Hounslow	183,300	197,600	+14,100	-2.9%
Total WLA	**1,391,400**	**1,545,800**	**+155,700**	**-2.9%**
London	6,119,700	6,792,600	++693,100	-2.8%

Source: GLA 2018 projections (2020), nearest 100

The working age population absolute growth is particularly low for some of the boroughs including Harrow and Hillingdon. The percentage share decrease for West London is the same as the average for London, at 2.6%. When looking at the individual boroughs, Hillingdon will experience the largest decrease in its proportion of working age population (4.1%), with Hammersmith and Fulham projected to only have a slight decrease (-0.6%). However, it should be noted that longer working lives may to some degree offset these projected declines in the population share aged 16-64.

The potential impact of having a decreasing proportion of working age population is for an increasing level of need for particular infrastructure types, with West London experiencing a relative increase in both younger and older members of society. This will drive a greater need for social infrastructure, especially in the education and health sectors, as well as accessible transport, the consideration of home-based digital provision and infrastructure that supports future leisure trends.

Further, the change in working age population can be usefully compared to the borough level employment growth projections and aspirations, as this too has implications on connectivity infrastructure.

3.2. Housing

Housing growth over the SIDP period is used to assess the future infrastructure needs, with a focus on strategic sites though the overall level of housing growth is considered.

3.2.1. Housing growth scenarios

For the purposes of the SIDP, two scenarios for overall housing growth are used, as infrastructure demand drivers. The first scenario is based on the borough level delivery targets as identified in adopted or draft Local Plans or the London Plan. The second scenario is determined by the MHCLG's National Housing Need Assessment, following updates to the Standard Methodology. This second scenario largely reflects a 'stretch scenario' beyond local targets, being 24% higher as a West London total[30]. However, for Hammersmith and Fulham and Hounslow the resulting MHCLG housing need is lower than their locally determined target. Borough by borough housing lower and higher scenarios, with their stated time periods, are presented in the table below.

Table 3-3 – Housing scenarios for West London

Borough	Lower scenario source	Per annum	Higher scenario source	Per annum
Barnet	WLSHMA 2018 (Barnet LP). For 2021-36	3,060	MHCLG National Housing Need	4,126
Brent	Local Plan, 2020 For 2019-41	1,866	MHCLG National Housing Need	2,746
Ealing	London Plan 2021 For 2019-29	2,157	MHCLG National Housing Need	2,398
Hammersmith & Fulham	MHCLG National Housing Need	1,377	London Plan 2021 For 2019-29	1,609
Harrow	London Plan 2021 For 2019-29	802	MHCLG National Housing Need	1,922
Hillingdon	London Plan 2021 For 2019-29	1,083	MHCLG National Housing Need	2,730
Hounslow	MHCLG National Housing Need	1,151	London Plan 2021 For 2019-29	1,781
Total WLA		**11,496**		**17,312**

Whilst these housing scenarios are not all qualified as additions for the 2020-40 time period of the SIDP, the implied growth for 2020-40 from these targets can be used as a reference, as Table 3-4 below:

Table 3-4 – Indicative 2040 Housing additions for West London

Borough	Low scenario 2040	Higher scenario to 2040
Barnet	61,200	82,520
Brent	37,320	54,920
Ealing	43,140	47,960
Hammersmith & Fulham	27,540	32,180

[30] *Standard Method Housing Need – using Housing and economic needs assessment guidance,* MHCLG (2019). Provided by WLA. December 2020 announcements showed a further stretch to 21,600 across West London.

Harrow	16,040	38,440
Hillingdon	21,660	54,600
Hounslow	23,020	35,620
Total WL	**229,920**	**346,240**

Source: analysis of determined base and higher scenarios of housing targets

3.3. Employment

Employment growth will drive infrastructure demands through:

- the need for workplace connectivity and infrastructure to facilitate smart working (digital);
- the need to meet commercial space demand for transport and utilities;
- the supporting of sustainable place-making as new employment space is developed; and
- the supporting of local areas to maximise the benefits (footfall and spend capture) and mitigate adverse impacts (congestion, increased energy use) of a growing workforce both from within and outside the borough.

3.3.1. Employment projections

GLA projections have been used for understanding long-term employment growth for West London. These are provided from a 2016 base and in 5-year increments, where Table 3-5 presents the projected growth from 2021-41.

Table 3-5 – GLA employment projections for West London

Borough	2021 employment	2041 employment	2021-41 change (per annum %)
Barnet	165,000	189,000	+24,000 (0.7)
Brent	138,000	149,000	+11,000 (0.4)
Ealing	159,000	171,000	+12,000 (0.7)
Hammersmith & Fulham	162,000	226,000	+64,000 (0.7)
Harrow	88,000	93,000	+5,000 (0.7)
Hillingdon	203,000	232,000	+29,000 (0.7)
Hounslow	189,000	217,000	+28,000 (0.7)
Total WLA	**1,104,000**	**1,277,000**	**+173,000 (0.7)**
London	6,065,000	6,907,000	+842,000 (0.8)

Source: GLA Economics 2017-based employment projections (latest published)

West London represents 18% of London's current employment and this share is projected to remain stable in 2041.

These long-term employment forecasts do not capture recent changes nor the impacts and potential legacy of the Covid-19 pandemic.

Oxford Economics have provided the WLA with a more updated set of employment projections to 2040. The 2019 (pre-Covid) and 2040 total employment, as well as employment change to 2021, 2025 and 2040, is shown in Table 3-6 for each borough.

Table 3-6 – Oxford Economics employment projections

Borough	–2019 total employment	2040 total employment	2019-2021 employment change	2019–2040 employment change	2021-2040 employment change
Barnet	163,800	181,100	-9,200	+17,200	+26,400

Brent	150,600	160,700	-7,500	+10,100	+17,600
Ealing	162,900	166,200	-5,000	+3,300	+8,200
Hammersmith & Fulham	154,400	177,400	-8,200	+23,000	+31,200
Harrow	89,700	97,900	-4,900	+8,100	+13,100
Hillingdon	206,700	221,300	-7,000	+14,600	+21,500
Hounslow	181,500	191,000	-6,900	+ 9,500	+16,400
Total WLA	**1,109,700**	**1,195,500**	**-48,600**	**+85,800**	**+134,400**

Source: Oxford Economics WLA projections (April 2021)

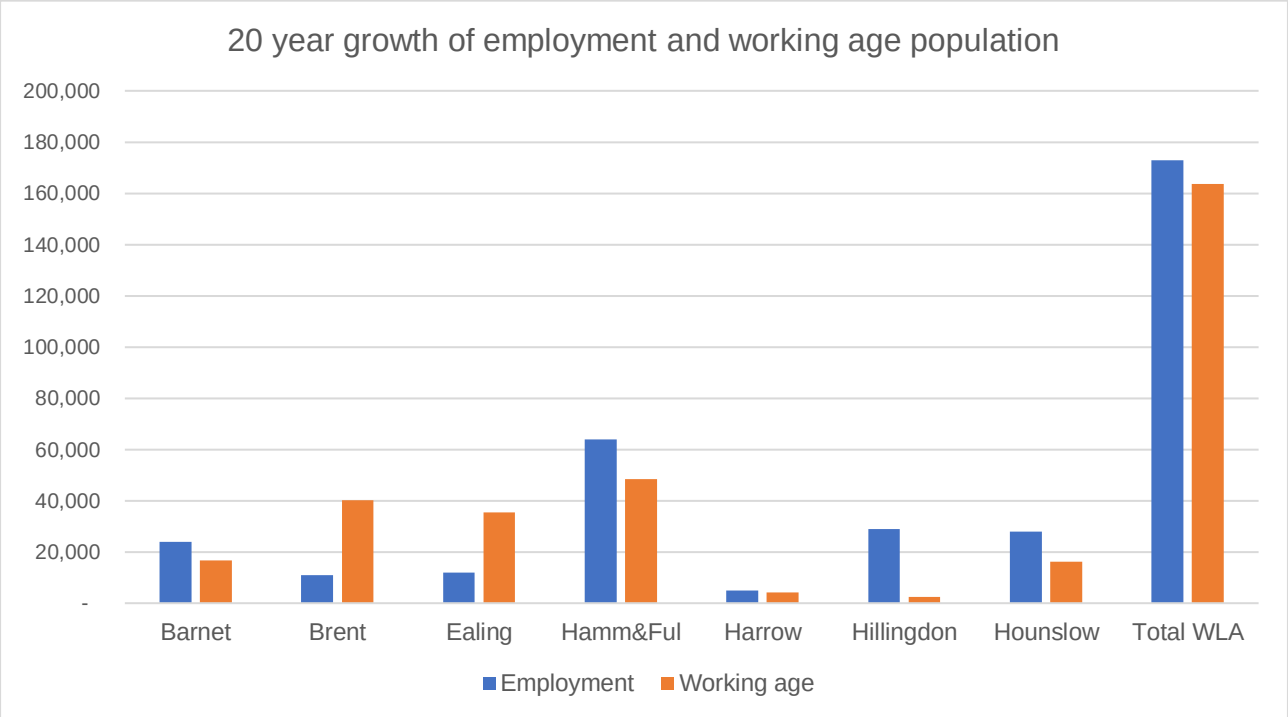
There is a significant fall in employment projected at 48,600 at the end of 2021 compared to the pre-Covid situation in 2019. The 2019 employment total for West London is reached by 2023, and by 2025 employment shows an increase of 26,400 compared to 2019.

In 2040, the total West London employment is projected to be nearly 1.2 million, reflecting a projected increase of 85,800 from pre-Covid (end of 2019) and 134,400 compared to 2021.

It is uncertain how employment changes would continue through to 2040, where employment in some sectors is anticipated to recover well whilst the legacy of Covid-19 may drive lower future employment than previously projected for some sectors such as accelerating declines in retail. Oxford Economics projects notable employment declines in manufacturing and transportation and storage, and notable increases in construction, ICT, real estate, professional services and administration and support services, and health sectors.

In using the employment projections to 2040 and assuming recovery though potential sectoral shifts, Figure 3-2 shows a comparison between projected working age population growth and employment growth.

Figure 3-2 – Working Age Population and Employment Growth Projections 2021-40



Source: GLA Economics 2017

This shows differentials across the boroughs, with Brent and Ealing projected to experience higher working age population growth than employment, whilst the other boroughs have higher employment projected than that which can be covered by local people of working age to 2040. Notably Hillingdon

has a large gap, driven in part by Heathrow and its surrounds, and whilst having the highest working age population share and growth, Hammersmith and Fulham has a gap to its projected employment.

For West London as a whole the twenty year employment growth of 173,000 is higher than the projected increase in working age population of 163,600 people.

As recognised by Oxford Economics[31], West London's employed residents outnumbered available local workplace roles by over 10% in 2019 where 105,000 more residents commuted out than commuted in from elsewhere. Two of the West London boroughs have net in-commuting – Hammersmith and Fulham, with a central location and varied and high value employment – and Hillingdon with net commuting of approximately 30,000 people and with Heathrow a key driver.

It is important to note that these employment projections are not inclusive of (all) the on the ground planned development, rather they reflect the London regional projections apportioned to the borough level. As is shown further below, the indicative employment capacity of the strategic sites are significant shares of the projected growth in borough employment.

3.4. Opportunity Areas

The West London Opportunity Areas (OAs) are summarised below. Appendix A provides a detailed assessment of the progress of the OAs according to development sites and planning status as well as the sites that make up these Opportunity Areas. This Opportunity Area site scale and progress has been used throughout the SIDP analysis.

3.4.1.1. Brent Cross and Cricklewood (LB Barnet)

Brent Cross & Cricklewood Area is an area of 324 hectares. Outline planning permission was secured in 2010 for a £4bn masterplan for c.850,000 sq. ft of retail space, 7,500 new homes and a new Thameslink train station, as well as major road and public transport improvements. The London Plan 2021 increased the previously stated job capacity to 26,000 jobs and indicative housing to 9,500. It is understood that the emerging approach is for an increase from the masterplan delivery of 7,500 homes, in response to changing economic conditions with a shift from office to residential use.

The Barnet Growth Strategy (2019-30) sets out the ambition for Brent Cross to become a broader cultural and leisure destination of national significance. It will deliver a new Metropolitan Town Centre and beyond homes provide commercial space, especially around the new Brent Cross West station with significant office provision, and space for smaller businesses and start-ups; an expanded retail offer, destination leisure and entertainment, cultural and arts facilities, restaurants, hotels as well as open space. Barnet will work with neighbouring boroughs of Camden and Brent to support the delivery of homes with joined-up placemaking.

The area also relates closely to the West Hendon area with an ambition to create a thriving new neighbourhood and replacement of poor-quality homes with over 2,000 high-quality houses (with 850 built so far) and improved public space and facilities[32]. A West Hendon sports hub is also being supported with water sports facilities at the Welsh Harp SSSI. The location of Middlesex University and RAF museum in the area are also important as its role as a regional destination.

3.4.1.2. Burnt Oak and Colindale (LB Barnet, LB Brent)

The Burnt Oak & Colindale Opportunity Area covers 262 ha of land. Formalised early plan making, which is still often referenced to[33], identified capacity for 12,500 new homes. This London Plan sets out an indicative 7,000 new homes and 2,000 new jobs.

The development is focussed around a new neighbourhood centre for Barnet, with the majority of new development to be built in Barnet as per Barnet's Colindale Area Action Plan (AAP), adopted in March 2010. In Brent, the Burnt Oak and Colindale growth area brings together sites along the west of Edgware Road, the A5 corridor and between Burnt Oak and The Hyde town centres.

[31] *How might coronavirus impact West London's economy?* Oxford Economics (June 2020)
[32] *Barnet Growth Strategy 2019-30*, LB of Barnet (2019)
[33] *Colindale Area Action Plan*; *The Burnt Oak, Colindale & The Hyde Placemaking Plan* ("the Placemaking Plan"), LB of Barnet (2014)

The West of Barnet, down the A5 corridor from Edgware to this Opportunity Area and to Brent Cross and Cricklewood (above) – will represent nearly two thirds of Barnet's housing delivery[34].

3.4.1.3. Wembley (LB Brent)

The Wembley Opportunity Area is 239 hectares in size. In 2015, Brent produced the Wembley Area Action Plan ("AAP"), which was intended to determine how the area would develop over the following 15 years. It includes guidance of over 30 development sites in the Wembley area, broken into 5 principal AAP areas – Wembley High Road, Comprehensive Development Area, Wembley Park Corridor and Wembley Industrial Estates.

The London Plan increased its stated capacity to 13,500 jobs and 14,000 homes. Much of the development land identified for housing delivery by the London Plan has obtained planning permission, with only 4 sites of significant capacity remaining[35]. The significant delivery of homes will be largely profiled across 2022-2030, with the four sites noted above likely to be later. Master planning is also being undertaken for the Neasden Station Growth Area, intended for mixed-use regeneration, industrial uses and homes delivery of around 2,000 homes, and is due to be published later in 2021.

3.4.1.4. Southall (LB Ealing)

Southall Opportunity Area is 523 hectares in size and the London Plan states an increased new homes capacity of 9,000 alongside 3,000 new jobs. The Great Western Industrial Estate will be safeguarded as SIL as set out in the London Plan. It will support B1c (light industrial), B2 (general industrial) and B8 (storage or distribution) uses, thus contributing a significant number of jobs to the 3,000 total required.

A number of the larger development sites are already completing units, with the Havelock Estate (922 units), Southall Waterside (3,475 units), West Southall (3,750 units) all in various stages of construction. However, all of these have uncertainty surrounding later phases which are expected to deliver significant new homes over the course of the Opportunity Area Framework period. These developments will have – in part – been facilitated by their proximity to the new Southall Elizabeth Line Station, which remains a key piece of infrastructure to unlock nearby sites[36].

3.4.1.5. White City (LB Hammersmith and Fulham)

Hammersmith and Fulham have identified 6,000 additional homes and 10,000 additional jobs within the White City Opportunity Area – a 110 ha zone to the eastern edge of the borough. The majority of the development will take place across White City East, and White City West. The comprehensive redevelopment of the area is identified in the 2018 Local Plan. The London Plan has proposed an increase in the number of new homes to 7,000, alongside a lower jobs target of 2,000.

The Local Plan identifies White City and Wood Lane Underground Stations as future focal points for office development, alongside other commercial, leisure, education and retail uses to supplement the regeneration, and states "Proposals for development in the WCRA should: […] provide commercial uses within a new mixed use area in White City East […] including academic and research facilities as well as the creative, media and bio-technology sectors." Development should build upon the large employment focus already in the area, with institutions such as the BBC and Imperial College being significant job creators in the area.

3.4.1.6. Earls Court and West Kensington (LB Hammersmith and Fulham)

The Opportunity Area was identified as having the capacity to deliver 7,500 homes and 9,500 jobs as a 38 ha area across Hammersmith and Fulham and Kensington and Chelsea. The majority of these homes and jobs are to be delivered in the former of these two boroughs, with an anticipated 6,500 homes and 8,500 jobs being accommodated within the borough. The London Plan proposes a reduction in the capacity to 6,500 and 5,000 homes and jobs respectively.

The majority of this development is anticipated to take place in two major sites – the Earls Court regeneration being delivered by Delancey (full planning for 5,647 residential units achieved in 2011)

[34] *Barnet Growth Strategy 2019-30*, LB of Barnet (2019)
[35] Cushman and Wakefield assessment (2020), using Molior – Appendix A
[36] Cushman and Wakefield assessment (2020), using Molior – Appendix A

and Lillie Square by Capital and Counties (full planning permission for 808 residential units achieved in 2011). Both of these developments are on site.

This Opportunity Area is part of the wider Fulham Regeneration Area. It is likely that a new Supplementary Planning Document (SPD) and masterplan will be produced for the Earls Court site due to the current situation regarding ownership.

3.4.1.7. Old Oak Common and Park Royal (OOC/Park Royal) (LPA: OPDC)

The London Plan defines the OOC/Park Royal capacity as 25,500 homes and 65,000 jobs across the 650 ha area and across the London Boroughs of Ealing, Brent and Hammersmith and Fulham. The first step in creating the OPDC's Local Plan was introduced in the form of the OPDC Opportunity Area Planning Framework (2015)[37]. Since these documents were produced, an additional document – the Local Plan: Second Revised Draft for Regulation 19 (2) Consultation (2018) has been published. The area is driven in its phasing with the new rail station at Old Oak Common, providing interchange between HS2, the Elizabeth Line and the Great Western Main Line at the Old Oak Common Station Cluster site.

The Local Plan examination has since been undertaken and modifications since made with consultation on these modifications underway (to July 2021). The plan period has shifted as part of this to complete in 2038, with just under 20,000 homes anticipated until that date, however the overall target of 25,500 homes remains the same.

Development within the 11 to 20 year period is largely driven by the opening of Old Oak Common Station (currently projected in 2028), This phase of development will see larger, strategic development sites being delivered, which will in turn require significant strategic infrastructure to enable their delivery, and to support the overall integration of these developments with those delivered earlier in plan period. In addition to new homes and commercial floorspace, development within the plan period will deliver an overall net increase of industrial floorspace.

There will be a new commercial and office hub focused around the new Old Oak Common station, providing the opportunity for a large share of the total employment aspiration, at up to 55,000. Park Royal will be protected as an industrial area, with industrial intensification at areas designated Strategic Industrial Land (SIL) located primarily within the Park Royal Industrial Estate and Old Oak North. This will support up to 2,000 businesses, including new and diverse businesses from a broader range for sectors and relocated businesses from Old Oak, allowing the area to accommodate an additional 10,000 jobs.

With the recent Local Plan Examination there is a shift of focus to the Park Royal area, which impacts the exact infrastructure requirements.

3.4.1.8. Harrow and Wealdstone (LB Harrow)

The London Plan increased the previously stated housing capacity to 5,000 homes, and a decrease to 1,000 jobs, for the Harrow and Wealdstone Opportunity Area of 177 ha. Much of the residential development is expected to be split across multiple smaller sites, and much of the proposed infrastructure is addressing local issues, rather than being large-scale infrastructure delivery connecting the Opportunity Area to other parts of the Borough, or neighbouring Boroughs.

The Opportunity Area is composed of seven action plan areas – Wealdstone West, Wealdstone Central, Wealdstone East, Station Road, Harrow Town Centre West, Harrow Town Centre Central and Harrow Town Centre East. Wealdstone West represents the larger with the Kodak and ColArt sites having over 1,000 residential units planned and over 1,300 jobs.

It is understood that the emerging approach is that the delivery of homes could exceed 7,000 units. This is based on schemes being intensified and with pre-application discussions, for example the Kodak site is now at around 3,000 homes.

3.4.1.9. Hayes (LB Hillingdon)

The London Plan defines the Hayes Opportunity Area as being capable of delivering 4,000 new homes and 1,000 new jobs across the 238 ha. The area has current planned delivery of between

[37] A Supplementary Planning Guidance Note written to accompany the Local Plan.

4,321-5,191 homes, including 847 affordable homes[38]. Whilst there is still a significant amount of identified developable land yet to be brought forward within the Hayes area, a lot of the land identified in the Hayes Infrastructure Study[39] has schemes already on site or in some cases completed. However, in the central part of the OA, around Hayes and Harlington Station, the area is still partly made up of industrial uses, although most of the identified development sites now at the very least have a planning permission outstanding against them[40].

3.4.1.10. Great West Corridor (LB Hounslow)

The extent of the Great West Corridor Prospective Plan Area has yet to be formally agreed by Hounslow, although various documents[41] made reference to it prior to its inclusion in the London Plan and it has now been submitted to the Secretary of State (December 2020). With the London Plan, the Great West Corridor is formally adopted as an Opportunity Area, with initial goals of achieving 7,500 new homes and 14,000 new jobs – although the Mayor has reserved the right to review and clarify this location – as well as the wider "Elizabeth Line West" portion of London subject to expansion proposals for Heathrow. Hounslow has also completed a masterplan and site allocation process[42], which indicates the area has the potential to deliver 7,500 new homes and 15,000 new jobs.

3.4.1.11. Heathrow OA (to be confirmed)

Since the 2016 London Plan was published and this Opportunity Area was identified, it has been concluded that it will not be progressed as first set out until a more definitive position is reached in terms of the potential expansion of Heathrow Airport. We understand this as the latest position, though recognise the area may re-emerge as a focus. Further, at time of writing, Heathrow expansion is still supported by the Airport National Policy Statement.

In the London Plan 2021, Policy T8 states that: '*The Mayor will oppose the expansion of Heathrow Airport unless it can be shown that no additional noise or air quality harm would result, and that the benefits of future regulatory and technology improvements would be fairly shared with affected communities*.' The area's potential contribution to London's growth will be reviewed and clarified when expansion proposals and their spatial and environmental implications are clearer, this will include review of the housing and job targets and work with boroughs to support more detailed plans.

The indicated capacity for Heathrow is 13,000 homes and 11,000 jobs shared with Hounslow and Hillingdon across an area of 700 ha. The majority of the 13,000 units were attributed to Hounslow.

3.4.1.12. West of Hounslow (LB Hounslow)

Hounslow Council have moved forward with defining the Hounslow section of the Heathrow Opportunity Area boundary and allocating growth within it, as part of the Draft Submission West of Borough Local Plan Review (LPR). The West of Borough Plan (part of Heathrow Opportunity Area) is being progressed in order to meet the London Plan borough wide target and the borough's objectively assessed need for housing and employment irrespective of a third runway.

The LPR allocated sufficient capacity for 10,600 homes (8,600 without Heathrow Gateway) and 13,600 jobs (6,350 without Heathrow Gateway) within Hounslow's proposed share of the Opportunity Area [43]. The West of Borough Plan will come forward without Heathrow expansion. For the SIDP this area is referred to as the West of Hounslow.

3.4.1.13. Opportunity Area contribution to growth

Table 3-7 below presents the indicative capacity for each of the Opportunity Areas. These strategic sites total a 105,600 new homes capacity for West London and 140,000 jobs. The figures for housing units and jobs are indicative – the London Plan states that it is for boroughs to establish the capacity for growth in each OA, informed by these figures. As has been noted in the Opportunity Area descriptions above, there are emerging conditions for where housing delivery may be higher as these

[38] *Local implementation Plan 3,* LB Hillingdon
[39] *The Hayes Housing Zone Development Infrastructure Funding Study,* LB Hillingdon (2017)
[40] Cushman and Wakefield assessment (2020), using Molior
[41] *Great West Corridor Plan: Issues Consultation* LB Hounslow (December 2015), LB Hounslow Local Plan 2015 – 2030
[42] *Great West Corridor Masterplan & Capacity Study,* LB Hounslow (2017). Jan 2021 Update.
[43] *Draft Infrastructure Delivery Plan,* LB Hounslow (2020). And WL SIDP input.

have been reflected below where specific Masterplanning of site allocation processes have identified these indicative levels.

Table 3-7 – Opportunity Area housing and job indicative capacities

Opportunity Area	Indicative housing units	Indicative jobs
Colindale / Burnt Oak	7,000	2,000
Brent Cross / Cricklewood	9,500	26,000
Harrow & Wealdstone	5,000	1,000
Wembley	14,000	13,500
Southall	9,000	3,000
White City	7,000	2,000
Earls Court / W Kensington	6,500	5,000
OOC / Park Royal	25,500	65,000
Hayes	5,000[44]	1,000
Great West Corridor	7,500	15,000
Heathrow*	13,000	11,000
- West of Hounslow	8,600	6,500
West London total (not incl. Heathrow but West of Hounslow)	**105,600**	**140,000**

*Source: London Plan (Dec 2019 Intend to Publish). *Heathrow OA currently no definitive position. However, includes West of Hounslow as per Local Plan Review and SIDP Input (for without Heathrow Gateway scenario). Hayes reflecting current anticipated housing unit total.*

The Opportunity Areas reflect 105,600 total indicative homes and this reflects 45% of the lower housing target scenario to 2040 (and 30% of the high/ stretch scenario). The Opportunity Areas are a significant component of housing growth.

A useful comparison is how many housing target years the Opportunity Areas cover, as in Table 3-8, noting this does not include OOC/ Park Royal, where this covers three boroughs and has not been apportioned to each but OOC/ Park Royal will contribute a significant amount of West London housing with an indicative total of 25,500 homes.

Table 3-8 – Borough housing target year equivalents covered by the Opportunity Areas

Opportunity Area	Lower scenario housing target	OA indicative housing totals	Year equivalents covered by OA
Barnet	3,060	16,500	5.4
Brent	1,866	14,000 (not including OOC/Park Royal)	7.5
Ealing	2,157	9,000 (not including OOC/Park Royal)	4.2
Hammersmith & Fulham	1,377	13,500 (not including OOC/Park Royal)	9.8
Harrow	802	5,000	6.2

[44] Set as 4,000 in the London Plan 2021, though 5,000 has been used given the progress to date on site and current planning and delivery considerations that LB Hillingdon have informed on.

Hillingdon	1,083	5,000 (not including Heathrow OA)	4.6
Hounslow	1,151	16,100 (including West of Borough)	14.0

Source: Atkins analysis. Not including wider Heathrow OA.

This analysis shows the strategic sites contribute significantly to some of the Borough's housing targets, notably Hounslow (with its West of Borough area), Hammersmith and Fulham and Brent without including OOC/ Park Royal, whilst the contributions are more modest for Ealing (without OOC/Park Royal included) Hillingdon, and Barnet.

The Opportunity Areas also provide a significant scale and contribution to the employment space and indicative jobs delivery in comparison with borough-wide employment projections and targets (e.g. borough Local Plans and Growth Plans), totalling 139,000.

The Brent Cross/Cricklewood Opportunity Area provides a significant level of indicative employment growth (26,000) to Barnet in comparison to the total projected employment growth for the borough (24,000), where Wembley Opportunity Area similarly provides a greater indicative employment level than the projected growth in Brent. These significant employment growth areas will drive opportunity for residents across West London and wider, where connectivity infrastructure is sufficient.

The OOC/ Park Royal Opportunity Area provides significant employment capacity (65,000 jobs) to 2040, driving employment growth across Hammersmith and Fulham, Ealing and Brent.

The West London sub-region as a whole is home to a high number of people who work at Heathrow, particularly for those that live close to the airport in Hillingdon, Hounslow, Harrow, or parts of Ealing. Whilst 3% of the sub-region's population work at Heathrow, it is the largest single employment location with over 50,000 employees[45].

Overall, the Opportunity Areas' total indicative jobs for West London is 140,000 including the West of Hounslow, reflecting over three quarters of the level projected by the GLA for 2021-40. This demonstrates the significance of the strategic sites, as largely Opportunity Areas, for the employment growth in West London.

Opportunity Areas are also likely to be increasingly important in light of the Covid-19 impact and the required recovery in delivering economic opportunities for West London. The Opportunity Areas provide a spatial focus for cost-effective, fit for purpose, smart and resilient infrastructure, which is critical to the delivery of growth sector space, and the homes to support and drive this growth. Further, Opportunity Areas can bring agglomeration benefits as new employment centres, as has been the case with the existing media cluster at White City and the 'Great West Creatives' Enterprise Zone.

New Southgate

The London Plan identifies New Southgate as an Opportunity Area, with an indicative 2,500 homes and 3,000 jobs. A planning framework will be produced jointly with the GLA, LB Enfield and LB Haringey. This will assess the development capacity of this area in the light of progress on Crossrail 2. New Southgate is on the border of Barnet and has been captured in the Barnet Growth Strategy. New Southgate is not included in the SIDP given its boundary location and where the New Southgate masterplan area is almost entirely located in the LB Enfield – therefore outside the WLA boundary. Further, it has a lower indicative delivery scale and has limited interaction with West London's other Opportunity Areas and needs. New Southgate does not meet the parameters agreed at the information gathering and methodology agreement stages of this report. However, it is a notable growth area and should be considered in the overall spatial view of growth.

3.5. Further strategic sites

Beyond the Opportunity Areas, further strategic development sites within West London have been identified. These sites may reflect submitted Planning Applications & Appeals and Approved Planning Permissions. The minimum site size to be part of this search was 500 units, before a further search above 250 units. Once identified, we have made a judgement call about the strategic nature of these

[45] *Sub-regional Transport Plan for West London*, GLA (2016), using 2011 census analysis

sites; for example, if a site is large enough to meet the parameters regarding size, but is also isolated from other development sites, we have not considered it to be 'strategic'.

It is important to note that the information we have been issued and sourced is incomplete. In some instances, sites have been disregarded due to unclear or non-existent assumed development timescales at the time of writing.

The results of market research (Appendix A) and provided sites information from boroughs is summarised below. These reflect those sites not completed by August 2020.

Table 3-9 – Further strategic sites

Site Name	Units proposed	Local Authority
Edgware Town Centre	2,379	Barnet
Edgware Underground & Bus Stations	2,317	Barnet
Millbrook Park	2,174	Barnet
Royal Brunswick Park	1,350	Barnet
Public Health England	1,020	Barnet
Broadway Retail Park	1,007	Barnet
Allum Way	888	Barnet
Edgware Hospital	800	Barnet
Brook Valley Gardens	631	Barnet
Finchley Central Station	556	Barnet
Grand Union (Northfields Industrial Estate	1,885	Brent
Abbey Industrial Estate	581	Brent
Capitol Industrial Park	501	Brent
Green Man Lane Estate	706	Ealing
Arcadia Centre	704	Ealing
Kings Road Park (Fulham Gas Works)	1,843	Hammersmith & Fulham
Grange Farm Estate	574	Harrow
RAF Uxbridge – St Andrew's Park	997	Hillingdon
Hillingdon Gardens	514	Hillingdon
Over 500 unit sites total >	21,427	
Tesco Coppetts	397	Barnet
Victoria Quarter Northern Site	304	Barnet
High Barnet Station	292	Barnet
Barnet House	254	Barnet
Westhorpe Gardens/ Mills Grove	251	Barnet
Alperton House	474	Brent
Atlip Road	335	Brent
NWCC Site	264	Brent
The Workshop	258	Brent
Park View Place	346	Ealing
The Wiltern (Hoover Building)	305	Ealing
3 Shortlands	351	Hammersmith & Fulham
Empress State Building	342	Hammersmith & Fulham
Fulham Riverside West	257	Hammersmith & Fulham

Royal National Orthopaedic Hospital	356	Harrow
Over 250 unit sites total >	5,050	
Total	**26,77**	

*Source: SIDP analysis * Blue Shading indicates a Failed Application*

Alperton Growth Area

Some of the sites presented for Brent are captured under the Alperton Growth Area. Alperton Growth Area seeks to deliver 6,800 units as composed from further strategic sites (including Grand Union, Abbey Industrial Estate, Alperton House) and a number of smaller sites. These smaller sites may together deliver more than 250 units within a small area. The overall indicative scale of Alperton has been recognised in the infrastructure considerations, where its growth is higher than that indicated by the further strategic sites which meet the SIDP parameters. Alperton, as the included sites, is shown on Figure 3-3.

Neasden

Master planning is being undertaken for the Neasden Station Growth Area, intended for mixed-use regeneration, industrial uses and homes delivery of around 2,000 homes, and is due to be published later in 2021. The site Masterplan will also seek to identify the additional housing that the West London Orbital (WLO) may support. This area to the South of Wembley and North of OOC/ Park Royal has been recognised in the SIDP infrastructure considerations, adding demand for this area of West London alongside Alperton and the two Opportunity Areas. Neasden, as the included sites, is shown on Figure 3-3.

Northolt

Northolt in West Ealing has a need for change to address its deprivation and inequality in employment, health, income and housing. Northolt lacks the infrastructure required to support existing residents and stimulate investment and regeneration, including low public transport access and lacking active travel infrastructure as identified by a Transport Constraints Review[46]. The potential for improved public transport connections to wider employment areas across West London is highlighted, including better connectivity to Uxbridge, Heathrow and the larger industrial estates to the north of Hayes and Harlington. Early work has been undertaken for a transformative approach to create a significantly improved sustainable suburb that can accommodate a significant number of new homes for Londoners over the next 30 years[47].

Northolt does not yet have confirmed sites or an indicative housing delivery scale, and is not included in Figure 3-3. However, the area has been recognised in the infrastructure considerations and informed by the Northolt Strategic Framework.

Hammersmith Town Centre

Hammersmith and Fulham are exploring several projects and potential alterations to be made to Hammersmith Town Centre. A Supplementary Planning Document is being prepared which will go alongside the 2018 Hammersmith and Fulham Local Plan. The Local Plan identifies the possibility of regeneration within the Town Centre potentially accommodating 2,800 new homes and 10,000 new jobs. Alongside Transport for London (TfL), Hammersmith and Fulham Council have been considering the option of removing the Hammersmith flyover and implementing a new ‘flyunder’ system – this is aspirational at present. The Town Centre has been recognised in the infrastructure considerations.

South Fulham Regeneration Area

The Hammersmith and Fulham Local Plan sets out an indicative 4,000 homes and 500 jobs, where the identified further strategic site King’s Road Park (Fulham Gas Works) is a key part of the area with over 1800 jobs. This regeneration area has been recognised in the infrastructure considerations.

These further strategic sites have also been mapped as clusters across West London, as demonstrated below in Figure 3-3.

[46] *Northolt Transport Capacity Review*, The Transportation Consultancy (2019)
[47] SIDP Engagement: LB Ealing (April 2021)

3.6. Spatial view of growth

The accompanying SIDP maps include:

- Map 1a and b – the West London Opportunity Areas and with the further strategic sites (Figure 3-3 below)[48]
- Map 2 – the West London Context, showing Opportunity Areas, town centres, rail and underground transport, the road network
- Maps 3-8 – supporting infrastructure need assessment including PTAL mapping, green infrastructure and flood risk areas.
- These growth areas and maps help identify notable cross-boundary areas which may drive infrastructure demand pressures and pinch-points, including:
- the A5 corridor through Brent, Barnet and Harrow and multiple strategic growth sites;
- the A40/ M1 and the Elizabeth Line corridor with Southall and Hayes, and growth extending West;
- the A406 corridor and meeting of proposed WLO stations with Brent Cross, Wembley and through to OOC/ Park Royal; and
- Growth through the M4 and A4, clustered with the Great West Corridor and West of Hounslow.

Alongside the corridors used by the Mayor in the new London Plan (Highspeed 2/ Thameslink; Heathrow/ Elizabeth Line West), work by the WLA and partners on the WLO is starting to identify scope for an orbital corridor, linking Old Oak with Barnet and Brent to the north and east and Ealing and Hounslow to the south and west. This may provide a new “centre of gravity” to the sub-region.

The following section sets out the strategic infrastructure baseline, which is assessed alongside the growth and demand drivers presented here to identify the strategic infrastructure needs.

[48] The West of Hounslow boundary is indicative, as shared for the SIDP. There are various growth sites proposed and planned within this area to meet the indicative housing and jobs as set out in Hounslow’s Draft Submission West of Borough Local Plan Review (LPR).

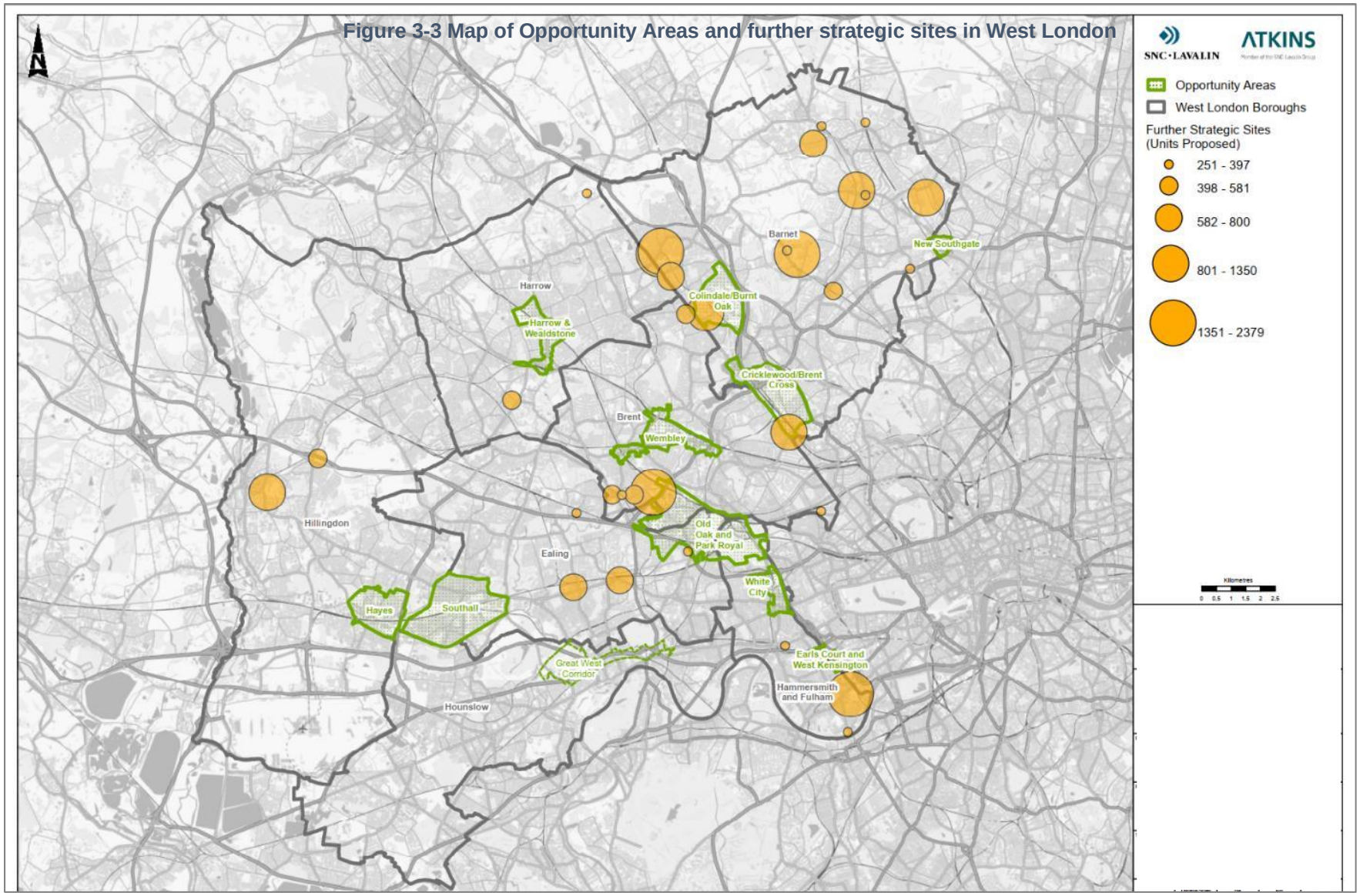


Figure 3-3 Map of Opportunity Areas and further strategic sites in West London

4. Strategic Infrastructure Baseline and Needs

4.1. Introduction

This section firstly sets out the baseline position and existing strategic priorities for infrastructure types in West London. It provides information on existing provision and assets, capacity and acknowledged challenges for each infrastructure type. It also collates schedules of known infrastructure projects in the pipeline and recently progressed. This has been determined using evidence that has been gathered from borough, West London and London/ regional strategies and plans, as well as engagement with boroughs and providers.

Summary – Baseline

- There is a lack of orbital links and connectivity within the region and its boroughs through the North and West. Orbital movements in some of the West London boroughs rely on cars and buses.
- Population is expected to grow significantly though some of the strategic growth areas are currently poorly connected by public transport and interchange, while others suffer from high levels of road congestion.
- Alongside express bus routes, the West London Orbital, cross-boundary active mode provisions and the utilisation of improved stations as inter-modal interchanges will support access to employment and existing and emerging socio-economic destinations. These are important to meet the Mayor's sustainable travel and emissions reduction targets over the SIDP period.
- There is a need to decarbonise West London's homes and workplaces, where strategic growth areas can drive local energy generation and storage, including district heat networks, solar power, energy centres and sustainable water catchment and drainage, smart technologies will be part of the response.
- West London falls under the Environment Agency's classification of being in 'water stress', as part of the wider South East and the reduction of per household consumption is critical over the period. Some of the strategic growth sites are within areas over of sewer capacity overutilization.
- Parts of the strategic growth areas fall under the Environment Agency's Flood Zones 2 and 3 and have nearby infrastructure assets which need to be protected for West London's socio-economic resilience, including river catchment level coordination.
- Drainage will need to be brought forward to manage surface water risks and should promote multiple benefits, including water use efficiency, improved water quality, urban greening, amenity and recreation – reflecting the strategic integration between green infrastructure and flood mitigation, with SuDS and waterway and open space improvements and interactions.
- There are open space deficiencies within West London's strategic growth areas and more widely. Opportunities exist to better link public open spaces and provide multiple, interacting benefits, as part of the All London Green Grid action areas that cover West London.
- Digital connectivity is critical for supporting the productivity of future growth sectors, such as green and knowledge intense sectors, and likely models of future working with more home based and local hub working. Strategic growth areas provide the opportunity to embed and test smart technology to meet strategic objectives and facilitate more efficient travel, consumption and climate change responses. Growth areas also require excellent connectivity for residents and businesses with ultrafast broadband and 5G provision.

This section then provides the judgement of strategic infrastructure needs in relation to the West London Opportunity Areas in particular. Engagement has supported the testing of these needs with

progress on key plans and stated proposals with information (including cost, timing and interactions) confirmed.

The strategic infrastructure needs are assessed by infrastructure sector, noting interactions, considering the future growth, challenges and opportunities. Following this assessment, categorisation of identified needs is made with commentary on the potential impacts from these infrastructure needs on the delivery of housing and commercial space development (Section 5).

Summary – Needs

The analysis set out in this section demonstrates that there are significant strategic infrastructure needs across all types to be delivered to accommodate both the renewal of assets for the existing population and to provide for future growth.

This includes some major transport needs ranging from new rail and road schemes, line extensions, station upgrades and corridor enhancements.

For energy which is a sector undergoing substantial transformation to a new net zero carbon world, considerable investment is needed to deliver decentralised energy programmes to Opportunity Areas and roll out zero emission networks. Cross boundary collaboration at a West London level in the planning and delivery of future energy infrastructure will be critical. Significant investment in maintaining future water supply and mitigation flood risk is also of particular importance to West London.

Investing in green infrastructure is a key component in West London's place making agenda and innovative use of new digital infrastructure needs to be planned in a manner which is integrated with other forms of infrastructure interventions (e.g. transport).

4.2. Transport

West London benefits from good radial transport infrastructure although, significant shortages have been highlighted including sustainable orbital links. West London has convenient road access to the rest of London and the major towns and cities of the UK, including the A4, A5, A30, A40 and A406 with a strong arterial road system and access to the major motorway routes. West London also benefits from excellent rail links for long distance and daily commuting trips through main lines from London to the South West, Wales, the Midlands, East Anglia and North West passing through.

The area will benefit from a number of new projects including the Elizabeth Line, High Speed 2, and a new multi-modal station at Old Oak Common. This should also help reduce the use of private vehicles, which still accounts for 43% of all journeys in West London. The use of stations as interchanges and development enablers is important for the area, where the West London Orbital is a key proposal here in unlocking housing and commercial land development and addressing areas of low public transport accessibility (PTAL).

Strategic planning to ensure walking, cycling and public transport are the first choices for travel is critical for improving quality of life, improving air quality and reducing congestion and inefficient road use. Developing new housing around stations and improving connections to town centres will mean more people have the things they need within walking or cycling distance, while destinations further afield will be easily accessible by public transport.

Transport plays a strategic infrastructure role for development in:

- promoting place-making and encouraging greener and healthier places, such as complementing Healthy Streets and Liveable Neighbourhood initiatives;
- mitigating and improving new development, including wider congestion issues, utilising developer contributions where possible;
- supporting labour market access to jobs, where public transport is especially important to lower income groups;
- supporting business productivity and enabling supply chain and sectoral clustering in well-connected areas, and attracting business investment; and
- unlocking new development sites for housing and business by improving viability with frequent and quality services and travel access.

The integration of land use and transport, and the provision of a robust public transport network, are essential in realising and maximising growth and ensuring different areas are connected in a sustainable and efficient way, supporting ‘Good Growth’.

4.2.1. Strategic policy priorities

4.2.1.1. London

The London Plan Policy T1 states that Development Proposals should facilitate the delivery of the Mayor’s strategic target of 80% of all journeys in London to be made by foot, cycling or public transport by 2041[49]. Developments should also make the most effective use of land, reflecting connectivity and accessibility with the existing and future public transport, walking and cycling routes, and ensure that any impacts on transport networks are mitigated. This is on route to a zero carbon transport network by 2050.

Policy T1 also states that Development Plans should support, and development proposals should facilitate proposed transport schemes. This list of schemes includes:

Table 4-1 – London Plan Proposed Transport Schemes - West London relevance

Scheme	Cost	Timeline
Cycle network development (London-wide)	Medium	2017-30
Electric vehicle charging infrastructure	Low	2017-41
Freight consolidation programme	Medium	2017-41

[49] There is a recognition that different targets can apply to outer London boroughs due to lower public transport accessibility.

Sustainable drainage system improvements on streets	Low	2017-41
ULEZ in Central and Inner London	Medium	2017--21
Walk and cycle bridge between Battersea and Fulham	Low	2020-25
Bakerloo Line extension	High	2020-30
Bus network: enhancements to meet existing and future demand Priory networks and demand-responsive bus services	Medium	2017-41
Crossrail 2 (including West Anglia Main Line 4-tracking	High	2020-41
Elizabeth Line	High	2017-21
Heathrow Airport Southern Rail Access (required if airport expansion proceeds)	High	2020-41
Heathrow Airport Western Rail Access (required if airport expansion proceeds)	High	2020-41
HS2 and associated National Rail changes, including mitigation of impacts at street level	High	2020-41
London Overground extension – West London Orbital	Medium	2020-30
London Overground strategic interchanges - Old Oak Common - and improved accessible interchange facilities across inner and outer London	Low	2017-30
London Underground air quality improvements	Low	2017-41
London Underground station capacity programme	High	2017-41
London Underground step-free stations and more accessible vehicles.	Medium	2017-41
London Underground upgrades – various (e.g. Deep Tube programme, Four Lines Modernisation programme etc)	High	2017-41
National Rail capacity increases (other lines)	Medium	2020-2030
Night Tube extensions	Low	2017-2030

Source: London Plan

The Mayor's Transport Strategy has three main objectives with the following outcomes:

- Healthy streets and healthy people – more Londoners will travel actively, and streets will be greener and more efficiently used with less traffic;
- A good public transport experience – a safe, secure and accessible network for all with pleasant, fast and reliable journeys; and
- New homes and jobs – transport Investment will unlock the delivery of new homes and jobs with active and sustainable travel the best options in new developments.

4.2.1.2. West London

An overall vision for West London transport has been defined as: '*a decongested transport system that ensures clean air in West London, whilst efficiently moving people and goods for work and leisure need*.' [50] This is supported by four goals: a world class hub airport underpinned by a circular economy model; enhanced rail capacity and the opening up of freight lines for passengers or Metro to support

[50] *Keep West London Moving: Report of the West London Transport and Infrastructure Policy Commission*, West London Business (2018)

orbital connectivity; leading provision for electric and shared autonomous vehicles, freeing up space for cyclists and freight; and the removal of super/ultra-fast broadband connectivity gaps.

The **TfL sub-regional Transport Plans**[51] for West London and North London reflect the following priorities, of which orbital transport is a key element:

- Enhance east-west rail capacity
- Improve access to, from and within key locations
- Enhance efficiency of freight movement
- Improve north-south public transport links
- Enhance connectivity and the attractiveness of orbital public transport
- Improve land based air quality
- Relieve crowding on the public transport network
- Manage highway congestion and make more efficient use of the road network
- Improve access to key locations and jobs and services

The **West London Freight Strategy**[52] set out initiatives including:

- Consolidation centre models for freight delivery
- More efficient and sustainable last mile delivery
- Fleet management with alternatively fuelled vehicles
- Water and rail freight promotion where practical

It was recognised that the Opportunity Areas provide excellent potential to shape and influence construction, delivery and servicing activity across the sub-region.

The SIDP has also been informed by the borough level strategic priorities, as reflected by borough Local Implementation Plans and Transport Strategies with common areas identified.

TfL input

The SIDP team have engaged with TfL. It was recognised that TfL are unable to provide specific input on schemes due to their current position and funding status. All funding for the design and implementation of projects was put on hold, whilst all projects will need to be reviewed in light of changing user behaviour due to Covid-19 and discussions with central Government about future funding.

TfL have confirmed their continued commitment to active travel, improving air quality and improving local connections and remain supportive of West London Orbital. Further, TfL are supportive of the objectives of Growth Area transport studies which have been completed to date[53].

This has implications for the ability to confirm planned and proposed projects at this time, as well as specifying the detail for the identified strategic transport needs (Section 4.2.4).

4.2.2. Current provision and challenges

The key transport challenges for West London - air quality, sustainable modal shift, public transport limitations and within West London connectivity – are described below with broad recommendations made. These are followed with a consideration of electric vehicles. The transport challenges have been used to inform the identified needs and schemes for West London, in Section 4.2.4.

The business perspective

Engagement with West London Business and Capital West London[54] focussed on some of the transport challenges and priorities, the following were raised:

[51] *Sub-regional Transport Plan for West London*, TfL (2016)
[52] *Freight Strategy,* WestTrans, Peter Brett Associates (2016)
[53] SIDP engagement: TfL (October 2020)
[54] SIDP engagement: Capital West London (September 2020), West London Business (September 2020)

- Congestion is a key business issue with significant delivery of goods using the road network
- Bus connectivity is constrained by congestion and limited services and stations in places, examples include Park Royal, Brent Cross South, Wembley, Imperial Wharf and Lionel Road to Brentford
- West London Orbital is a high priority for existing business as well as investors and developers
- Significant investment in cycling infrastructure is needed to realise the opportunity
- Innovation in the freight transport sector can address key challenges of congestion and air quality and realise economic opportunities

Road congestion

West London suffers from significant highway delays and congestion. TfL suggests this may constrain employment growth as congestion and poor reliability adds costs to business operations[55]. Most road infrastructure is radial , with more limited orbital connections. Congestion is added to with traffic on West London's roads with origins and destinations outside the sub-region, whilst Heathrow brings significant surface traffic alongside the sub-region's logistics sector. The amount of freight traffic, in particular light goods vehicles, is growing. This contributes to increasing traffic and congestion.

Some of West London's town centres and growth areas are situated on major roads, which can suffer more from poor air quality, noise, severance and road safety issues for its pedestrians and cyclists. Examples include the A5 and A406 with Brent Cross, Colindale and Wembley, Southall on the A40, and the Great West Corridor situated between the M4 and A4.

Reliable deliveries and servicing, and easy access to workplaces and key destinations rely on an increasingly-efficient transport network. Long-term solutions to road congestion are focussed on making road use more efficient and with modal shift including dedicated bus lanes, active mode provision, freight consolidation and innovation alongside the introduction of low emission zones.

West London connectivity

The A406, A312, A4006, and A408 are important in providing strategic orbital connectivity between areas of economic importance. The A40, A4020, M4/A4, and A315 provide the key radial connections across the sub-region between the growth areas and town centres[56].

Orbital connectivity in West London is highlighted across transport strategies as a challenge, where this is either car or car and bus dependent. For example, Hillingdon's limited orbital links is a factor for 53% of residents travelling to work by car, compared to an average 38% for other outer London boroughs[57], and car dependency is higher in Northern areas of Harrow, Barnet and Barnet in particular.

East-west movements utilise tube and rail connections significantly more, though these are often at capacity at peak times[58]. West London has good radial links into Central London, which will be further supported by the Elizabeth Line in providing capacity, shorter journey times and relieving network pressure.

Overall, the lack of public transport connection between some residential and job hubs in West London is recognised. For instance, Brent is well connected to Central London but less well connected to other outer London boroughs and to Heathrow airport. The Overground network provides some connectivity between growth areas in Brent and Hammersmith and Fulham, though these do not connect into Hounslow. In the outer boroughs of Harrow and Hillingdon there is also an absence of orbital rail connections between growth areas and town centres.

Table 4-2 provides a summary of existing connectivity between Opportunity Areas and town centres from existing evidence bases, notably the West London transport infrastructure constraints study[59].

Table 4-2 – Opportunity Areas and key centres - existing connectivity

[55] *West London sub-region assessment*, TfL (2016)
[56] *West London Transport Infrastructure Constraints: Evidence Base,* Regeneris and Systra (2017)
[57] *West London sub-region assessment*, TfL (2016)
[58] TfL analysis, presented in *Keep West London Moving: Report by the West London Transport and Infrastructure Policy Commission ,* West London Business *(2018)*
[59] *West London Transport Infrastructure Constraints: Evidence Base,* Regeneris and Systra (2017) – connectivity matrix

Area	Overall	Mode specific
Old Oak and Park Royal	Strong interconnectivity to other areas by road and rail. However, there are severance issues and congestion with the strategic road network.	Limited rail and gaps to some centres – Colindale, Hounslow, Uxbridge, Brent Cross
Earls Court and West Kensington	Strong interconnectivity to other areas by road and rail.	Gaps to Brent OAs, indirect road only to Southall
Wembley	Generally good connections, but lacking links to some other areas	Some good road and rail links, but notable gaps to Brent Cross, Colindale /Burnt Oak, Hounslow and Southall
White City	Generally good connections, but lacking links to some other areas	Gaps to Brent OAs, indirect road only to Great West Corridor, Hounslow and Heathrow
Great West Corridor	Generally good connections, but lacking links to some other areas	Better East-West links but limited to the North and North East, particularly by rail
West of Hounslow	Generally good connections, but lacking links to some other areas	Limited links to the North and East, particularly by rail
Harrow and Wealdstone	Some good connections but isolated from a number of others, often in terms of rail	Reasonable access to east, but limited south and west (Hounslow and Heathrow)
Southall	Some good connections but isolated from a number of others	Better East-West links but limited to the North and North East (Harrow, Brent) and Hounslow
Hayes	Some good connections but isolated from a number of others	Limited links with Great West Corridor, Uxbridge and Harrow to North
Brent Cross/ Cricklewood	Lack of orbital connections to rest of sub-region, impacting integration	Limited to road, with better access to Wembley and OOC/ Park Royal
Colindale/ Burnt Oak	Lack of orbital connections to rest of sub-region, impacting integration	Limited to road, with only indirect road to Wembley and OOC/ Park Royal

Overall, the lack of orbital connection – in particular for outer boroughs that are less economically reliant on Central London, is a recurring challenge. Orbital rail would reflect a step change here, whilst inter-modal connectivity and effective bus route provision would be significant interventions.

Some of the Metropolitan town centres such as Harrow have higher PTAL ratings and outer London generally shows variation, with higher levels of PTAL generally aligning to where there is regular London Underground services. Across the West London area there are some areas including growth and regeneration areas where there is poor interchange between these areas and established town centres and employment centres. PTAL tends to be high in inner boroughs, although this varies within boroughs, for instance Ealing Broadway has accessibility levels of 6b, while Park Royal and Norwood Green have 1a or 1b.[60]

The figures below, as accompanying maps 3 and 4, show West London PTAL levels projected for 2021 and 2031 which captures committed projects. The current stations, the Elizabeth Line stations and the proposed West London Orbital stations are also shown. This highlights the areas with PTAL remaining low (0-3) to 2031 with committed schemes.

[60] *Draft Transport strategy,* LB Ealing (2018)

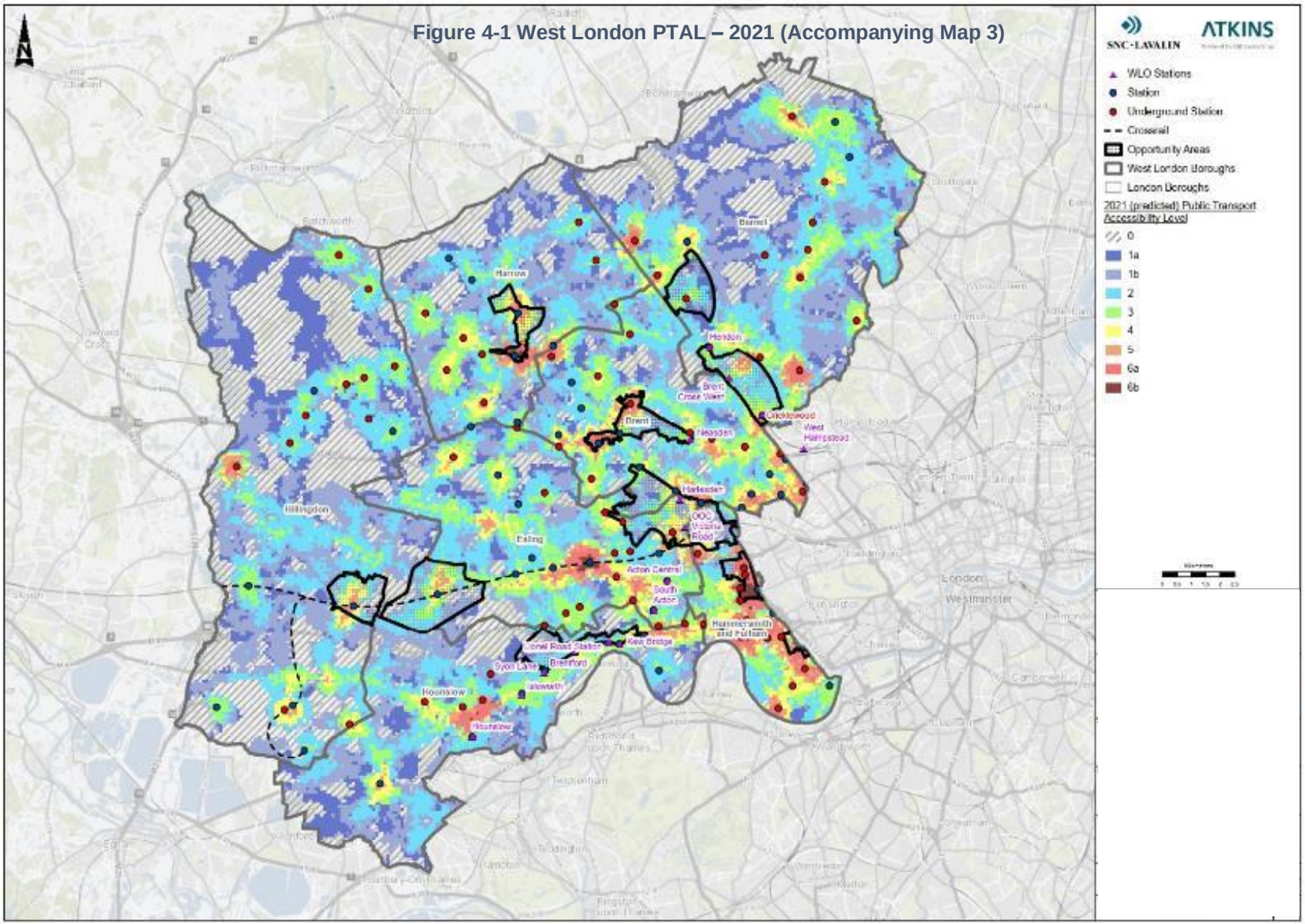


Figure 4-1 West London PTAL – 2021 (Accompanying Map 3)

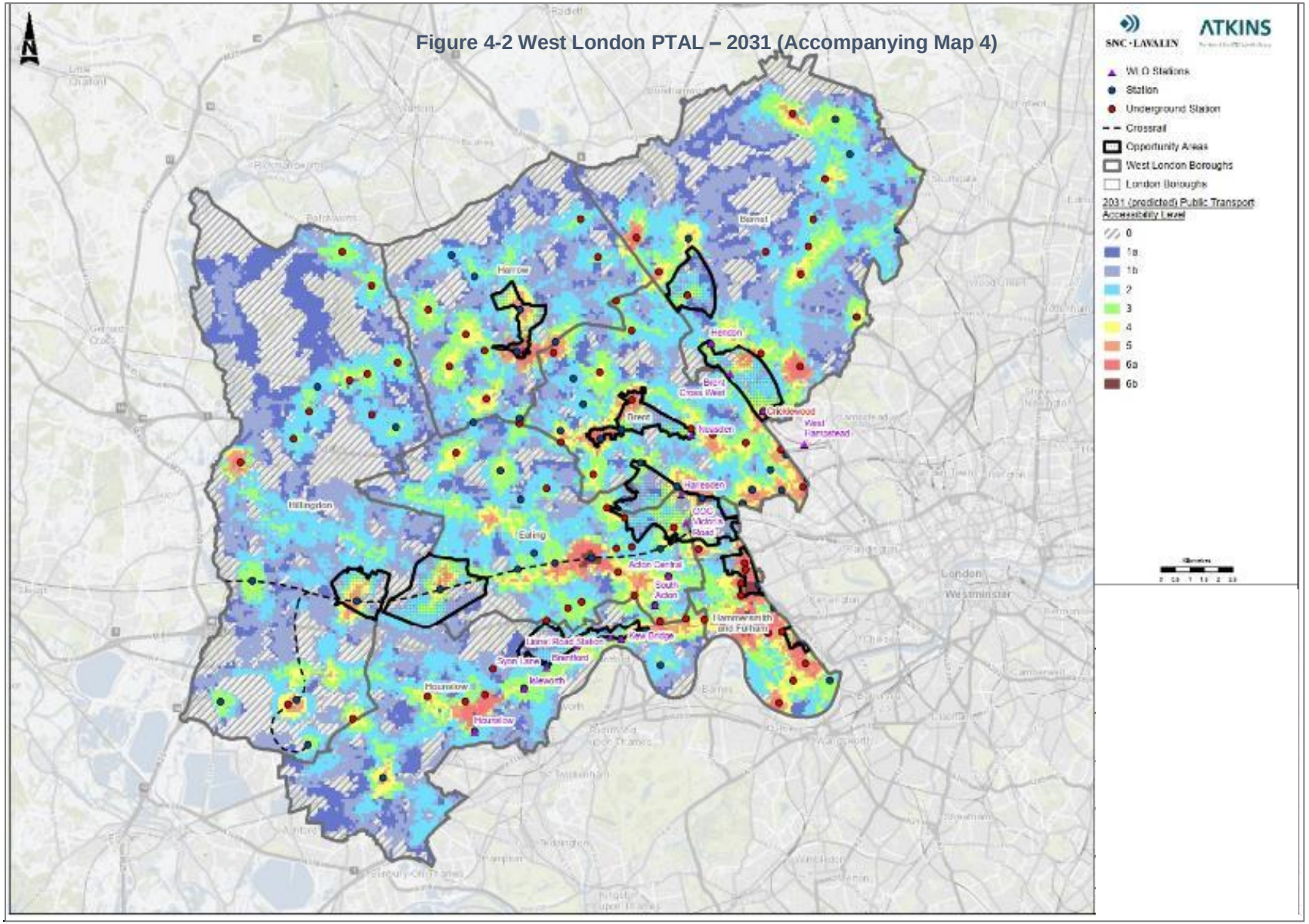


Figure 4-2 West London PTAL – 2031 (Accompanying Map 4)

Public transport limitations

The lack of orbital connections within the sub-region is particularly critical for outer London boroughs; whose economy is less reliant on Central London. More residents of the inner boroughs work in Central London, where existing infrastructure is better adapted to their needs. In parts of Hammersmith and Fulham, Brent and Ealing, up to 62% of residents work in Central London, while in many neighbourhoods of Hillingdon and Hounslow this figure is below 12%[61].

Crowding levels are currently relatively low generally but increase as rail and Underground trains approach central London[62] whilst there are some localised issues including on the Piccadilly Line. Congestion in central London can impact traffic and the attractiveness of the lines in outer boroughs. For instance, the Northern line has issues with capacity where it is the most crowded of all lines in the AM peak (130%)[63], which is of concern to Barnet in particular.

Further:

- The frequency of some national rail services is low, contributing to a perception that West London is not well connected;
- Bus delays occur due to road congestion, with freight and through-borough traffic on key roads, as well as street parking space;
- There is a lack of orbital bus connectivity in some places including north-south in Hillingdon and east-west in Brent, a lack of bus services for Park Royal, capacity issues at Hayes Town Centre and Harrow bus station operating over capacity;
- There are access issues for some of the underground and rail stations; and
- The current route network does not always serve the destinations that people require, with poor connection to local services such as hospitals.

Modelling undertaken by Regeneris and Systra[64] has compared public transport and road journey times. There are significant variations in car and public transport journey times for movements between: Brent Cross and Ealing; Wembley and Ealing; Hounslow and Old Oak; Harrow and Heathrow; and Uxbridge and Heathrow. Analysis has shown a large demand for movements along the A406 corridor, with a significant level of these journeys being bus journeys that are subject to delay. It was concluded that the potential for new orbital rail connections was well demonstrated, particularly in relation to connections between West London's growth areas.

Public transport connectivity between West London's growth areas would also reduce the need for residents to travel into Central London and support West London's economic growth.

Air quality

Given its strategic position connecting Central London to key national motorways and assets (such as Heathrow Airport), West London suffers from significant congestion on its main roads, with subsequent impact on air quality. In Hammersmith and Fulham, it is estimated that 1 in 4 deaths can be attributed to air pollution, which is an important risk factor in heart disease, stroke, lung cancer and respiratory diseases.[65]

Almost all of West London is covered by an Air Quality Management Area (only a small area in Brent is not covered) – meaning that the national air quality objectives are not predicted to be achieved. As a response, the boroughs and OPDC have produced air quality action plans.

Recommendations and recent advancements, where boroughs have a role, include:

- Revising the Local Plan to promote environmentally-friendly policies and systematically assess the impact on air quality of new developments
- Finding solutions to freight pollution, by encouraging conversion to low-emission vehicles and longer-term innovation;

[61] *Travel in London Report 11*, TfL (2018)
[62] *West London sub-regional transport plan,* TfL (2016)
[63] *Tube Capacity,* London Assembly (2019). Accessed at: https://www.london.gov.uk/questions/2019/19838
[64] *West London Transport Infrastructure Constraints: Evidence Base,* Regeneris and Systra (2017)
[65] *Report of the Hammersmith & Fulham Air Quality Commission,* London Borough of Hammersmith & Fulham (2016)

- Encouraging a move to cleaner fuels, from increasing parking fees to diesel vehicles to enabling significant growth in Electric Vehicle use;
- Encouraging public transport, including integration through public realm improvements around stations;
- Increasing pedestrianisation, cycling and greening in town centres;
- Adhering to construction and building standards that are less polluting; and
- Implementing, where appropriate, traffic restriction measures, such as Low Emission Neighbourhood (LEN) areas to reduce and divert some of the traffic.

The Mayor is encouraging boroughs to audit every school within an area of high pollution. Seven schools have already been audited in West London as part of the 50 school audit, funded by the Mayor's Air Quality Fund. The recommendations for these include moving school entrances, better road layouts around schools and restrictions of high polluting vehicles, and adding green infrastructure as 'barriers' to filter fumes around schools. These interventions will be funded through a range of sources including school or borough match funding to £10,000 per school from the Mayor and the Mayor's Greener City Fund.

Sustainable transport mode shift

TfL Travel Reports[66] have explored the share of private vehicle trips that could be substituted. A lack of alternative was experienced more in outer London, whilst across London 71% of private trips could be feasibly made by walking, cycling or public transport. It was assessed that only 36% of private vehicles journeys in Hillingdon had a current viable alternative.

The boroughs' latest Local Implementation Plans include modal share analysis, as below.

Table 4-3 - Borough transport mode shares – originating in borough

Borough	Private vehicle	Bus/ tram	Rail	Underground/ DLR	Walk	Cycle	Taxi/other	Sustainable total
Barnet (2014-2017)	46%	13%	2%	7%	31%	1%	1%	54%
Brent	41%	18%	2%	8%	29%	1%	1%	58%
Ealing	37%	18%	10%		32%	2%	1%	52%
Hammersmith & Fulham (OOC Study)	20%	15%	5%	16%	38%	5%	1%	79%
Harrow (2014-17)	50%	10%	1%	7%	30%	1%	1%	49%
Hillingdon	56%	13%	1%	6%	24%	1%	4%	45%
Hounslow	42%	14%	5%	7%	28%	3%	1%	56%
outer London (2014-17)	47%	13%	4%	5%	28%	2%	1%	52%
Greater London	34%	14%	5%	9%	33%	3%	2%	64%

Sources: Boroughs' LIP3; Hammersmith and Fulham via Old Oak Common Study; Hounslow SIDP Input

This shows that Barnet, Brent, Ealing and Hounslow perform as well as outer London (for its 2014-17 average) for their sustainable mode shares, whilst Harrow and Hillingdon are currently below at 49%. Hammersmith and Fulham is near the Mayor's Transport Strategy aim for 80% sustainable mode share for inner London. Outer London Boroughs have their own sustainable travel target below this. Active mode reflects around a third of resident trips for much of the West London boroughs, with Hillingdon (25%) and Hammersmith and Fulham (43%) notable exceptions.

Hotpots of congestion and air pollution make walking and cycling particularly unappealing and dangerous, whilst journeys in outer London are longer on average where encouraging multi-modal

[66] *Travel in London Report 11,* TfL (2018)

journeys and facilitating those connections is needed. A lack of cycling facilities, by number and by their usefulness, on key sites and with new development is a noted challenge[67]. Some socio-economic groups are also underrepresented in cycling access and activity. Harrow notes that despite a significant network (41km of cycle routes, around 10% of the road network) there has been low cycling uptake[68]. Brent identifies a disparity where the north of the borough had 1% cycling, compared to 2-5% in the south[69]. In Hounslow, only 5% of potentially cyclable trips are currently made by bike and TfL analysis has estimated 80,000 daily trips that could be converted to walking, particularly to Hounslow's town centres[70]. Major rail and road links (such as the A4/M4) can be slow and difficult for cyclists and pedestrians to cross. Several locations have been identified for safe crossing interventions.

A lack of a strategic transport cycle network has also been identified as a barrier to modal shift, as well as the need to reduce competing uses on these roads. Several borough LIPs and Transport Strategies have identified a borough wide cycling network, or a West London level network, as an important longer-term intervention.

There has been progress on local cycling routes alongside TfL's cycle priorities as per the Strategic Cycling Analysis (2017) and Action Plan (2018). Electric bike trials, including Brunel University and Harrow have also been undertaken with WestTrans, with proposed routes covering Brunel to Hillingdon hospital, canal access and extensions through to Ealing and Hounslow.

Modal shift recommendations are focussed on:

- Appealing and accessible cycling networks, using segregation where possible;
- Appealing and accessible pedestrian routes, utilising green spaces as possible;
- The linking of cycling and walking routes to transport hubs;
- The effective provision of cycling parking facilities across West London's sites; and
- Express bus routes to rail and Underground/ Overground stations and between key residential and employment areas, using priority lanes as possible.

Collaboration and cross-boundary working is an important aspect across these challenges. With high private vehicle dependency in parts of West London as well as vehicular use in the sub-region's critical logistics sector, and following the ULEZ extension, electric vehicle uptake and supporting infrastructure is particularly important (detailed below).

It is also recognised that many of the emerging and proposed schemes for cycling support radial routes. However, shorter and more local cycling trip facilitation will be important to provide alternatives to car use for a wider range of people and trip purposes, including schools, local jobs, retail, leisure and green space access.

West London collaboration on transport challenges

The WestTrans partnership of six of the West London boroughs - Brent, Ealing, Hammersmith and Fulham, Harrow, Hillingdon and Hounslow – are focussed on addressing challenge areas including congestion, the impact of HGVs and last mile delivery, public transport provision and orbital movements[71]. WestTrans have also been working on station access, travel plan monitoring and demand responsive buses and electric bike trials.

Station access work is focussed on the strategic priorities for access, considering new development and where the impact would be most felt, which will complement the Network Rail and TfL station access programmes. Travel plan monitoring covers over 600 sites in West London, including assessment of whether there is sufficient cycle parking and electric vehicle facilities.

[67] SIDP engagement: WestTrans (September 2020)
[68] *Local Implementation Plan* 3, LB Harrow (2019)
[69] *Local Implementation Plan* 3, LB Brent (2019)
[70] *Local Implementation Plan* 3, LB Hounslow (2019), using TfL (2017) analysis – strategic analysis of cycling potential; and analysis of walking potential
[71] SIDP Engagement: WestTrans (September 2020)

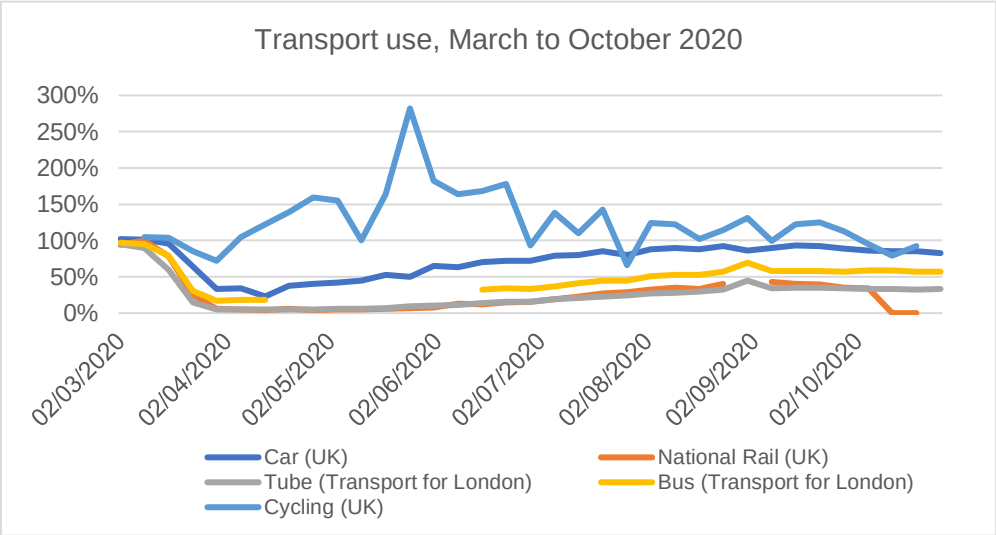
The Covid-19 pandemic, and its legacy, relate to these challenges and provide a further decision factor for strategic infrastructure planning and delivery.

The COVID-19 impact and future resilience

The repercussions of the COVID-19 pandemic and Government's measures have had a significant effect on mobility in London and elsewhere in the country.

This effect has been threefold:

- **Lower overall mobility**: the latest Google analysis (October 23rd, 2020) reported a 41% decline in visits of retail and recreation spaces and a 12% decline in supermarkets and pharmacies compared to usual trends. Mobility trends for workplaces were 44% lower than usual, and 5% lower for parks. This has varied significantly throughout the March to October period, in line with restrictions.
- **Lower use of public transports**: The Citymapper Mobility Index reports that at its minimum, journeys dropped to just 7% of normal use. According to that same index, the level of mobility in London on October 27th was 45% of its usual level.
- **Change in modal use**: the reduction in public transport use may have caused a move to other modes of transport. As shown in the chart below, car use nationally has declined less than other modes of transport and reached 84% of its usual level on October 26th compared to just 23% for the London Tube and 57% for London Buses. There has been a significant boom in cycling, where the end of October cycling use was close to past trends (92%).



Source: DfT. For simplicity the graph plots transport use on Mondays of each week since March.

These changes in behaviours are unlikely to be wholly temporary. It is unclear how long the pandemic and social distancing measures will have to be applied whilst the pandemic and greater consideration for the environment may create long-term changes in travel behaviour.[72]

The impact on modal transport use has been greater in central and inner London than outer London[73], demand has also been more maintained on orbital routes such as the Gospel Oak to Barking line.

Overall, transport schemes will need to be reviewed in light of Covid-19 and broader changes in users' behaviours. Specific points should be particularly considered:

- **Modal changes and impact on the public realm**: as walking and cycling are increasing as a result of social distancing, councils must ensure these two transport modes are safe and usable. Responses have included the widening of pedestrian space in the busiest streets or making high-streets car-free.[74] New cycling routes have also been created, some temporary and others long-

[72] *Changes in transport behaviour during the Covid-19 crisis*, IEA (2020). Accessed at: https://www.iea.org/articles/changes-in-transport-behaviour-during-the-covid-19-crisis
[73] *Google Mobility by Borough - London Datastore*
[74] *COVID-19 Secure: safer public places – urban centres and green spaces*, HM Government (2020)

term. TfL launched their “Streetspace for London” programme to support this, including restricted traffic, protected cycle lanes, reduced speed limits and wider footways.[75]

- **Future of working:** trends towards home working may prove to have been permanently accelerated from the pandemic, whilst rather than central employment locations workers may travel to a range of local bases. This raises the role of local connectivity and where the rethinking of town centres and high streets can boost local sectors through worker spend where more of the working day is spent in local centres.
- **Risk in car use increase**: there is a risk of car use increase due to a reluctance to use public transport. This would worsen the congestion and air pollution situation that existed pre-Covid and could also impact progress made to improve active transport modes. Walking and cycling are currently more attractive alternatives where there is less traffic and pollution than usual.[76]

4.2.2.1. Electric vehicles infrastructure

At the time of writing the UK Government has set a target that all new Petrol, Diesel, and Hybrid vehicles will be banned from sale in the UK in 2030. In order to meet this deadline, all major car manufacturers are launching full electric versions of their current range. This results in a need for an increase in Electric Vehicle Charging Points (EVCP). Further, the extension of the London Ulta-Low Emissions Zone (ULEZ) to the North Circular may be a prompt for the adoption of EVs by logistics and other businesses.

Electric vehicles are approximately three times more efficient than petrol cars and produce no tailpipe emissions. Although currently making up just 1.8% of all new vehicle registrations in the UK, electric vehicles are increasingly popular[77]. Battery prices fell by 80% between 2010 and 2016, reducing overall vehicle costs, and some cars can now travel up to 300 miles on a single charge[78]. Sales are likely to continue to grow, where new technology adoption tends to accelerate once 5% of market share has been achieved as experienced in Norway where electric vehicles now account for almost half of all sales[79].

It should also be noted a small number of manufactures are offering cars and HGV’s powered via hydrogen. At this time, it is not clear what the split may be between EV and Hydrogen vehicles in 2035.

Across West London there have been some introductions of EVCs. For example, Hammersmith and Fulham have installed over 100 charging points as part of the Source London scheme as well as rapid charging points at Wormwood Scrubs car park with others committed in Hammersmith Town Centre. Lamp column charging points are also proposed, using match funding obtained from OZEV (Office for Zero Emission Vehicles) and GULCS (Go Ultra-Low City Scheme)[80].

To support the encouragement of low emission vehicles and shifts to sustainable and active modes, the West London boroughs and partners have considered the introduction of car clubs and Workplace Parking Levies, demand management through parking limitations and provision of EVC infrastructure. The introduction of these measures to meet sustainability targets are well suited to new developments in facilitating new behaviours and incentives, such as membership trials. Workplace Parking Levies work by providing limited parking provision for workplace sites where businesses need to pay for extra spaces and thus work to manage employee travel to work options and incentives. Revenues raised can then be used for wider infrastructure to enable sustainable travel mode shift, whilst the unused land space can be put to sustainable use such as cycle storage/ facilities, EVCs or public realm and green space. Coordination between boroughs is critical in this issue and in respect of limiting the factors that can lead to business relocations.

[75] *Streetspace for London,* TfL. Accessed at: https://tfl.gov.uk/travel-information/improvements-and-projects/streetspace-for-london
[76] *Cycling and Covid-19: what London needs to do now, and when the lockdown lifts*, LCC (2020), Accessed at: https://www.lcc.org.uk/articles/cycling-and-the-covid-19-crisis
[77] *National Infrastructure Assessment,* National Infrastructure Commission (2018)
[78] ibid
[79] *Electric car sales grew by 40% in Norway this year*, Electrek (2019). Accessed at: https://electrek.co/2019/01/02/electric-car-sales-norway-2018/
[80] *Local Implementation Plan* 3, LB Hammersmith and Fulham (2019)

Heathrow Ltd have been developing an EVC strategy for their entire Airside and Landside fleet[81]. This includes vehicles to service the aircraft, blue light vehicles, Border Force vehicles, transfer buses, and short stay / long stay parking. The Heathrow 2.0 strategy states that Heathrow will reduce emissions from airside vehicles and develop a ULEZ for airside vehicles for 2025 to improve local air quality. Heathrow will also introduce, this year, a drop off fee per vehicle (£5) though this revenue is not currently ring-fenced for specific transport or air quality purposes. Significant EVC infrastructure is required to meet this aims across passengers, employees, taxi and private hire vehicles, as well as a secondary focus of coaches, buses and freights. Charging methods may include Ultra Charging points, valet charging and bay charging, where the demand, technology and commercial aspects need to be carefully considered.

The key challenges and unknowns at this time for EVs and EVC infrastructure can be summarised as follows:

- Whether the local energy distribution network can accommodate the additional loads, where extensive upgrade will be required.
- Whether the National Grid can support the estimated demand caused by the increase in use of EVs, with more green energy.
- A current lack of coordinated planning for the roll out of EVCP, especially in public spaces and on street, with a more demand reactive approach that is not facilitating a well distributed network.
- The predicted uptake of EV for domestic use and fleet / non – domestic fleet use, and in response to ULEZ extensions. Delivery by drones may significantly reduce the number of delivery vehicles required though this may be less relevant in West London given airspace constraints.
- The capital cost of EVs, which will affect uptake.
- The range of EVs, where increased range reduces number of charges required.
- The effect of hydrogen or biofuel powered vehicles on non-domestic EV uptake, though hydrogen may be less viable in production and delivery (especially in the SIDP timeline) and reflect a complementary source.
- Whether the technology will allow the development of pure EV HGV's or whether these will be Hydrogen powered.
- What will be the acceptable EV re-charge times from empty to full in 2030, where 10 minutes is suggested.
- What size (kW) of charger will be required to achieve EV HGVs
- Whether a standard plug will be used by all EV manufacturers, where there are different ones at present.
- The UK Government policy towards EV may change, where the end date has already been moved earlier to 2035 from 2040 and may be brought forward to 2030[82].
- The UK Building Regulation update may require EVC to all new domestic properties.
- Approaches on retrofitting older properties for EVC purposes, or alternative provisions where this is not possible.

The challenge of this emerging area is that a consistent approach in terms of the technology, infrastructure and standards for development and other key sites is not yet there. This is partly driven by the sector uncertainty as to the most effective technology and infrastructure provision and whether the energy supply and network capacity is and will be sufficient to meet demand. Without a set development standard and with low current asks of developers once development is complete the scale and type of provision may no longer be fit for purpose. This is an important challenge for West London to address.

Figure 4-3 provides the transport baseline for West London, showing the road network, rail and underground stations and railway.

[81] Atkins appointed by Heathrow 2018 for this work
[82] UK Government announcement November 2020

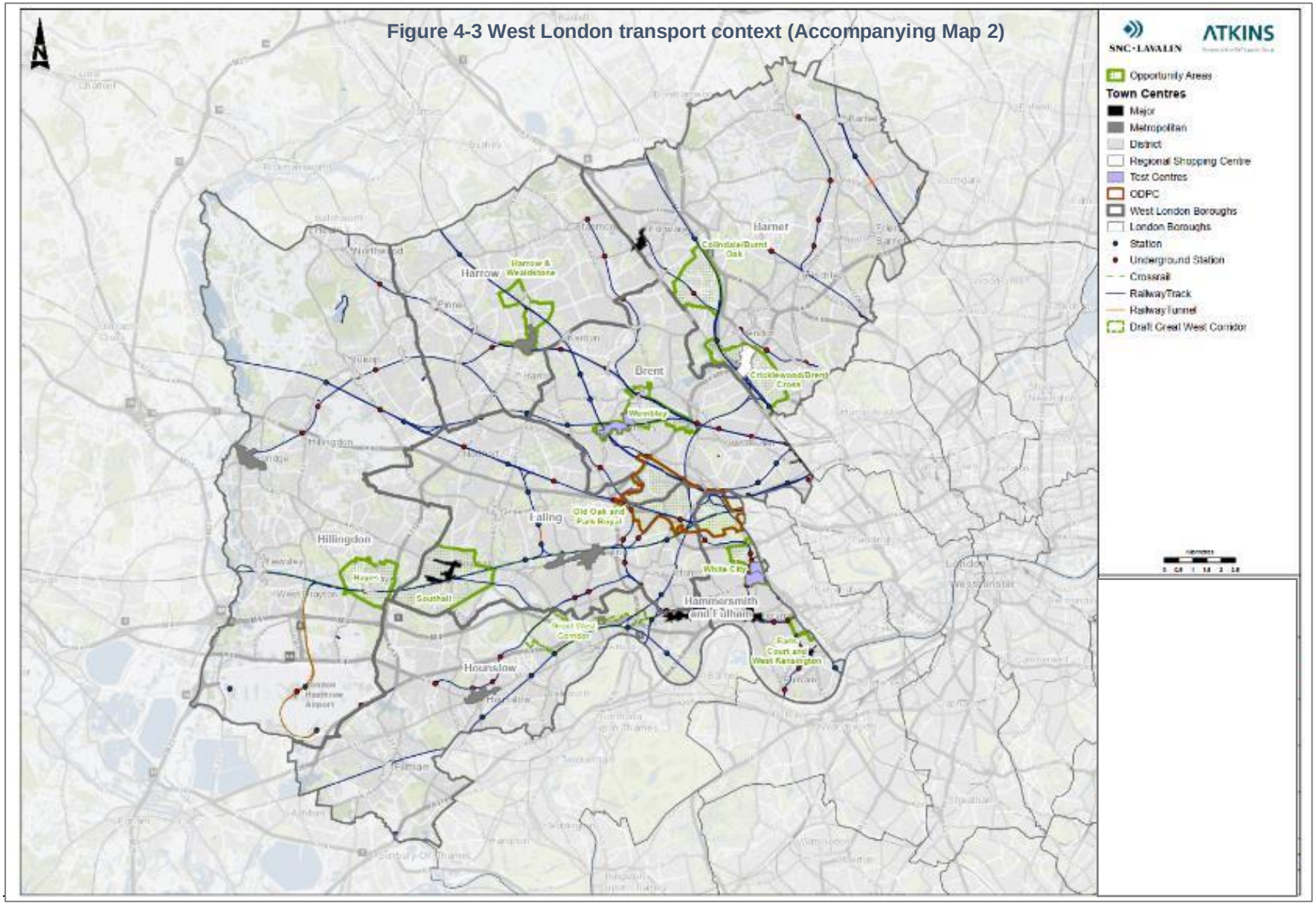


Figure 4-3 West London transport context (Accompanying Map 2)

4.2.3. Planned and proposed strategic infrastructure

Transport plans that are currently planned or propose which will have a significant impact to West London's transport infrastructure and connectivity are summarised below.

4.2.3.1. West London significant projects

The Elizabeth Line is expected to increase capacity within West London, including an estimated capacity increase to Central London of 10%, relieving underground crowding, improving journey times and station congestion as well as helping to reducing car traffic.

The Elizabeth line operation provides services between Paddington and Heathrow and further to Reading, before full services to the West End, City and Docklands, and further Shenfield and Abbey Wood in the East. the Elizabeth Line services with stations in Ealing (Acton Main Line, Ealing Broadway, West Ealing, Hanwell and Southall) and Hillingdon (Heathrow T5, T4 and Heathrow Central, Hayes and Harlington and West Drayton) provide significant new capacity through high frequency and improved journey times to Central London as well congestion relief which will support the wider sub-region. These West London stations will significantly improve PTAL in catchment areas with currently low PTAL (See Section 4.2.2). The Acton Main Line station also provides access for Hammersmith and Fulham residents. Elizabeth Line works integrate with the Great Western Mainline electrification, directly impacting stations in Hillingdon - Hayes and Harlington and West Drayton; and Ealing - Southall and Ealing Broadway.

Old Oak Common station will become a transport super hub, linking HS2, Great Western Rail, Heathrow Express, the Elizabeth Line and Overground services. This is the critical enabler to opening up access to OOC/ Park Royal and unlocking the significant homes and commercial development to transform this part of West London with cross-boundary economic development and jobs access.

The West London boroughs are seeking to maximise the impact of Elizabeth Line through station improvements and with further proposed interchanges. For example, West Drayton and Hayes and Harlington stations in Hillingdon will have supporting public realm improvements, with identified bus services to provide further connectivity to the line[83]. Brent has identified that journey times will be significantly reduced to Heathrow with a direct interchange between HS2 and the Elizabeth Line at Old Oak Common. A potential link between Brentford and Southall would also support a wider catchment area with improved PTAL.

Planned Future Service Levels – Network Rail input

Given that the introduction of the full Elizabeth Line service is nearing completion, the service levels outlined below are based on an assumption that this service level is operational (due in 2022).

Service levels are derived from long-term planning work and demand forecasting that informs the capacity required to be delivered.

Peak

- Main line services – 20tph, 16tph GWR services, 4tph Heathrow Express services
- The Elizabeth Line services – 12tph
  - 6tph Reading – London Paddington
  - 6tph Heathrow Airport – London Paddington, 4tph to T4, 2tph to T5

Off-Peak

- Main Line services – 16tph, 12tph GWR services, 4tph Heathrow Express services
- The Elizabeth Line – 10tph
  - 4tph Reading – London Paddington
  - 6tph Heathrow Airport – London Paddington, 4tph to T4, 2tph to T5

Proposed: West London services through HS2 and WCML – Network Rail input

[83] *Local Implementation Plan* 3, LB Hillington (2019)

The Long-term strategic perspective for West London will be based on capacity released by HS2, and infrastructure and capacity changes driven by increased suburban and local services on the West Coast Main Line. This is driven by the anticipated increase in requirement for commuter capacity into central London largely from the Northampton and Milton Keynes area.

Most intercity services currently operating on West Coast Mainline (WCML) will be transferred to the High Speed network. Capacity will be released for stopping suburban services at Harrow and Wealdstone and Wembley Central – improving local and suburban rail connectivity, with increased opportunity for interchange with DC services alongside direct travel to Euston/central London.

There is also potential for a reopened WCML stopping service at Queens Park station with a link to development at Old Oak Common and an additional opportunity for interchange from the WCML to HS2 in the future (ahead of reaching Euston).

The future programme is subject to change particularly in relation to HS2 and in response to the Covid-19 impact and recovery in demand, which may drive service changes and infrastructure or capacity changes on the West Coast and Watford DC Lines. However, the outline indication is for:

- HS2 Phase 1/2a (or interim configuration state) c.2029-2031 – subject to change, but will release material capacity and permit additional stops at Harrow and Wealdstone and Wembley Central (and potential Queens Park),
- HS2 Phase 3b and Euston HS2 station fully open c.2033-2036 – subject to change but releases full capacity and full connectivity associated with HS2 infrastructure to Manchester and Eastern Leg – as above, with additional services at Harrow and Wembley.

Collaboration with Local Authorities will be required in order to understand potential for interchange, improvement in local transport connectivity, and impact on passenger capacity and pedestrian flows at West Coast Stations in particular.

Additional West Coast services at Harrow, Wembley and (potentially) Queen's Park will improve suburban and Local connectivity. Though these services may result in additional pressure on capacity and drive associated changes in infrastructure to accommodate over the long term. These would need to be considered with future demand patterns and the infrastructure requirements assessed for any changes following capacity releases.

Aspirational Proposal: Crossrail 2

The proposed railway linking the South West to North East London would further increase capacity. Whilst it is an aspiration for Crossrail 2 to become operational in the 2030s, as stated in the London Plan, financial constraints facing TfL and the Government resulted in work on the proposed scheme being put on hold for the foreseeable future. The Mayor has submitted the Strategic Outline Business Case for the scheme.

Crossrail 2 would open up some opportunity for West London to maximise development arising from additional capacity and linkages, though the line is only likely to run through a small part of West London.

Barnet has identified that it will support a reduction in overcrowding on the Northern Line, particularly if a New Southgate link is included that will support growth and reduce congestion such as on the A406[84]. The station area would provide potential for development at New Southgate, as a liveable neighbourhood for 2035 onwards, whilst it could be linked to the WLO route with Hendon station[85].

It had been proposed that a Crossrail 2 station at Imperial Wharf in Hammersmith and Fulham would unlock regeneration areas, such as brownfield land in south Fulham[86], and could be an important strategic interchange. TfL's previous consultation response was that the case for Kings Road is stronger, partly driven by the costs of the extra distance to Imperial Wharf (with the impact of underground sewer infrastructure, tighter route curves and slower times). Imperial Wharf could otherwise by linked to Crossrail 2 via Clapham Junction on the London Overground line.

[84] *Barnet Transport Strategy*, LB of Barnet (2018)
[85] *Local Implementation Plan* 3, LB Barnet (2019)
[86] *Local Implementation Plan* 3, LB Hammersmith and Fulham (2019)

Proposed: Western rail – Network Rail input

Reading to London Paddington

The most recently published plans for the Reading to London Paddington section of the network are in the 2015 Western Route Study.

However work is underway on the London Paddington to Reading Corridor Study, which will provide an updated strategy for the corridor between 2029 and 2050, focussing on the period after the HS2 Interchange Station at Old Oak Common becomes operational (assumed to be 2029 though the Oakervee Report stated a window between 2029 and 2033 for the commencement of operations for HS2 Phase One).

Old Oak Common will be served by main line (GWR, Heathrow Express) and the Elizabeth Line services, providing direct connectivity to HS2 services.

The introduction of the Elizabeth Line services will provide a step-change in capacity on the relief lines between Reading and London Paddington.

Two entries are included in the Rail Network Enhancements Pipeline (RNEP – Autumn 2019):

- Thames Valley Corridor Capacity Programme – seeks to deliver additional main line seating capacity into and out of London Paddington
- London Paddington Station Congestion Relief Programme – seeks to alleviate pedestrian-flow congestion at London Paddington

Both schemes are in the early stages of development, both in terms of defining the outputs that will be proposed and the potential cost and timescales.

These are notable where a significant share of West London is in the Heathrow-Slough travel to work area (TTWA) rather than the London TTW area.

Western Rail to Heathrow

Network Rail continues to work with the Department for Transport, industry partners and local stakeholders to develop proposals for a western rail link to Heathrow Airport. Construction would commence following a final investment decision by the Department for Transport, which in turn follows confirmation of a Development Consent Order. The project is still in its development / design stage, with proposed delivery and costing for the scheme to be confirmed once a Final Business Case has been approved.

Planned: London Underground upgrades

- The Deep Tube Programme, as part of the Mayor's Transport Strategy, for the Piccadilly, Central and Bakerloo lines. The Piccadilly Line will receive new rolling stock, signalling and track improvements. For Ealing Broadway the Piccadilly Line is proposed to be substituted for the current District line. For the Bakerloo Line enhancements, a new fleet of trains is planned, recognised as being necessary on a safety minimum basis, with signalling and station upgrades.
- Northern line capacity improvements, including a 40% increase to Bank Station capacity by 2022 and capacity increases at Camden Town to support increased frequency. This would particularly support Barnet.
- The 4 Lines Modernisation Programme, with new air-conditioned and more spacious fleet across the Circle, District, Hammersmith and City and Metropolitan lines, with track improvements to provide smoother and more reliable services and signalling improvements to support higher service frequency. The expected delivery of the programme was 2023, where works will enable frequency to be increased to 32 per hour in central London during peak times with more trains on the Metropolitan Line. Capacity on the lines could be boosted by up to a third in the peak[87], supporting Ealing, Hounslow and Hammersmith and Fulham with the Circle, District and Hammersmith and City lines, and Harrow and Brent with the Metropolitan Line.

These schemes are dependent on TfL's long-term funding deal agreement with Government.

[87] *London 4 Line modernisation,* Thales Group (2017). Accessed at: https://www.thalesgroup.com/en/events/uitp/news/london-4-line-modernisation

Ongoing: Station access

Network Rail and TfL have been implementing a programme of improved station access across West London. WestTrans have also been considering priorities from a strategic perspective for future growth and demand.

Station access projects include:

- Step-free access work taking place as part of the Crossrail On-Network-Works Programme at Southall, Hayes & Harlington, Acton Main Line, Ealing Broadway, West Ealing, Hanwell and West Drayton.

  These include new ticket halls at stations; new lifts and footbridges to ensure step-free access to all platforms serving Crossrail; new signage, help points, customer information screens and CCTV; platform extensions to accommodate the 205m long Crossrail trains and Driver Only Operation (DOO) cameras. Network Rail are also working with Crossrail and local councils to integrate plans for improvements to the areas around the stations.
- Cricklewood and Mill Hill Broadway, with multi-model and bus links with the rail station access for all programme
- Syon Lane access improvements completed by Network Rail, with Isleworth next
- Underground step-free access at Mill Hill East, Burnt Oak, Colindale, Ruislip Manor, Eastcote Northwood, Northwood Hills, West Ruislip, South Ruislip, Stanmore, Rayners Lane and Canon's Park
- Northolt station access for all programme
- Harrow on the Hill modernisation with step-free access and better platform access
- An access for all scheme at Queen's Park, re-entering the multiple option phase[88]

Ongoing: M4 Smart Motorway

Highways England are improving the M4 between Junction 3 at Hayes and 12 at Theale, providing an additional lane for traffic and technology to smooth traffic flows for more reliable journeys and reduced congestion. These works are due for completion in 2022.

Ongoing: Decarbonisation of public transport

The Ultra-Low Emission Zone (ULEZ) was introduced by TfL in Central London in April 2019. All vehicles entering the zone, at any time, that do not conform to Euro VI standards are charged £12.50 a day (on top of the existing Congestion Charge). The current ULEZ has seen a reduction in older and more polluting vehicles, up to a third in the first four months[89]. The Ultra-Low Emissions Extension (ULEX) will extend to the North Circular for light vehicles, which will be a significant extension in addressing air quality from 2021. The 2021 expanded ULEZ splits some of West London's boroughs causing a disparity of standards and impacts within boroughs and the sub-region as a whole, in advance of a full extension for 2025. Four new zero emission zones will be established by 2025, of which the OOC/ Park Royal will be one.

Double-decker electric buses are also being introduced whilst the bus network in outer London may also increase where TfL has committed to redistributing bus capacity from overprovisioned Central London to underserved outer London.[90] From the end of 2020 all of London's new buses will either meet or exceed the Euro VI standard, with a full cleaner and greener fleet for a low emission London by 2037.

West London has three current low emission bus zones[91]:

- Barnet and Brent - Edgware Road (Staples Corner to Maida Vale) from Cricklewood Broadway via Shoot Up Hill to Kilburn High Road

[88] SIDP engagement: Network Rail (November 2020)
[89] *Barnet Transport Strategy final draft,* LB of Barnet (2019)
[90] *TfL proposes new outer London route as it confirms plans for central London's buses,* Transport for London (2019). Accessed at: https://tfl.gov.uk/info-for/media/press-releases/2019/april/tfl-proposes-new-outer-london-route-as-it-confirms-plans-for-central-london-s-buses
[91] *Travel in London Report 11*, TfL (2018)

- Hillingdon and Hammersmith and Fulham - Uxbridge Road to Shepherds Bush from Uxbridge Road via Ealing Broadway, The Vale to Uxbridge Road
- Hammersmith and Fulham - Chiswick High Road to Kensington from Chiswick High Road via Hammersmith Broadway to Kensington High Street

Ongoing and proposed: Cycleways

TfL are working on future Cycleways, though the development of these has been paused whilst the Streetspace for London scheme is prioritized as a response during the Covid-19 pandemic. This is to ensure more space for people to walk or cycle now and as the city emerges from the pandemic. This has included temporary cycle lanes and wider pavements.

The identified Cycleways, as part of TfL's strategic cycling analysis and action plan[92], for West London include:

- A315 Cycleway 9 along Chiswick High road – Isleworth section started as response to the pandemic and the Chiswick section underway
- Ealing to Greenford – proposed open 2021-24
- Acton to Wood Lane – proposed open 2020
- Hammersmith segregated cycling along King Street, Hammersmith Road and through to Shepherds Bush – at various stages of development[93]
- Edgware Road to Tottenham Court Road – construction due 2020 – proposed open 2021-24
- Olympia to Brentford – construction due – proposed open 2021-24
- Brentford to Hounslow – construction proposed 2021-24 – and open by 2024
- Hornsey to North Finchley via Alexandra Palace - construction proposed 2021-24 – and open by 2024
- Wembley to Willesden - construction proposed 2021-24 – and open by 2024
- Wembley to Harrow Weald - construction proposed 2021-24 – and open by 2024
- Hounslow to Richmond - construction proposed 2021-24 – and open after April 2024
- The strategic analysis identified other high potential schemes for further study: Hounslow to Heathrow; Shepherds Bush to Southall; Fulham to Wembley; and Kilburn to Edgware.

4.2.3.2. Committed project developments

The following schemes have been identified as part of the pipeline as committed and funded projects, from the borough level but with significance due to their cross-boundary or Opportunity Area supporting role.

- **Brent Cross West Thameslink station and new bus station -** to be delivered by 2022 and 2025 respectively and providing enhanced access for Brent Cross and its catchment area to St Pancras and the Midland Mainline. Further, a rail freight consolidation centre will be provided for the Opportunity Area.
- **Wembley High Road and Triangle** – improvements for access with redesign of the Wembley Triangle, with improved streets layout, junction works and active mode provisions.
- **North Circular works** - New road access to the North Circular in Alperton, with footbridge and cycle route at Brentfield Road junction and access to St Raphael's estate due.
- **Northwick Park transport connections with access improvement** using the housing infrastructure fund.
- **Hayes Town Centre bus improvements -** Capacity increased with a Hayes & Harlington station interchange, bridge widening and bus priority lanes.

[92] *Strategic Cycling Analysis*, TfL (2017); *Cycling Action Plan*, TfL (2018)
[93] SIDP engagement: LB Hammersmith and Fulham (November 2020)

- **Uxbridge bus and underground upgrade** - with appropriate level of bus stand provision through local planning developments, due for 2021/22 completion.
- **Feltham Town Centre and Station Interchange -** this includes Hounslow Railway Bridge as a major scheme. Phase 1 is complete and the whole scheme is due for 2024 completion.

4.2.4. Identified needs and options

This section sets out the strategic transport needs for West London. These have been determined through building the rationale for proposals, beyond the baseline and committed projects (Section 4.2.2 and 4.2.2.1), in how they respond to West London's indicative growth and address the identified challenges, and as inputs provided through document review and engagement.

The set of identified schemes are detailed below covering their rationale and proposals, interactions, estimated costs and proposed timelines. The schemes include:

- West London Orbital
- Willesden Junction Interchange
- North Acton station
- OOC/ Park Royal enabling transport, including Old Oak Common station
- Brentford-Southall rail link
- Colindale station
- Harrow & Wealdstone station
- Harrow on the Hill station
- Gunnersbury station
- Uxbridge Central Line extension
- Further connectivity to WLO and the Elizabeth Line
- A406 corridor
- A5 corridor
- Hammersmith fly-under
- Great South West and wider roads
- Wembley access
- West London cycling network
- Express bus routes
- Electric Vehicles and Future mobility
- Freight transformation
- Heathrow Sustainable surface access

Where timelines have not been specified from review or engagement, the SIDP West London development trajectory (Section 5.3) has been used to suggest a delivery timeline.

4.2.4.1. West London Orbital

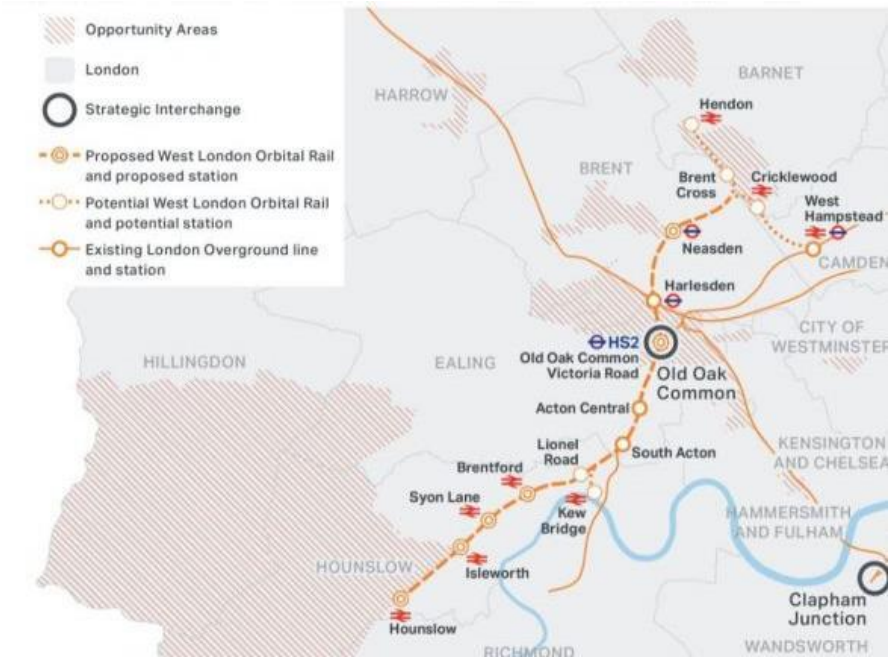
Rationale and proposals -

The West London Orbital is an Overground rail proposal to improve orbital travel in the outer London boroughs, connecting North to West London, where trips within the sub-region are currently dominated by car use and there is poor public transport network coverage and reliability. The WLO also supports quicker and less crowded access into Central London and enhanced access to Heathrow through its link onto the Elizabeth Line.[94] The WLO also supports realisation of the benefits for West London's residents and businesses from the area's Opportunity Areas and wider growth. For example, the scheme will increase the population within a 1-hour travel time of Old Oak Common by 500,000 people (1.7m to 2.2m), widening the effective labour market catchment of Old Oak and Park Royal[95].

The WLO is proposed to restore rail passenger services on the Dudding Hill line that is currently used for freight, connecting with the North London Line Kew to Acton link and then with the mainline Hounslow Loop up to a possible 12-mile route. The WLO would connect town centres and regeneration areas, including new homes and jobs that will be created at Old Oak Common, Wembley, Brent Cross and the Great West Corridor, supporting intensification of these areas and accommodating population growth.

The proposed route was initially set out to serve 15 stations with four new stations at Harlesden, Neasden, OOC Lane station and Lionel Road. This included a proposed eight trains per hour in each direction, with four trains every hour between Hendon and Kew and four trains every hour for West Hampstead to Hounslow, enabling eight trains an hour for the Neasden to South Acton section. This service pattern has been used to date but will be refined going forward with the Business Case and options analysis. The WLO would provide 11 new interchanges with other rail services – for example with the Elizabeth Line and HS2 at Old Oak Common; the London Overground network; and s the Jubilee line and Bakerloo Line in the North. There were two proposed branches to the North, to West Hampstead via Cricklewood and to Hendon via Brent Cross West.

Figure 4-4 Early proposed WLO route and stations – Mayor's Transport Strategy



[94] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020)
[95] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020)

Source: Mayor's Transport Strategy (2018)

The route would help reduce demand on the orbital road network, including the A406, supporting the switch to sustainable modes, as well as reduce congestion on other parts of the public transport network. The extension of the London Overground would connect the Opportunity Areas of Brent Cross/Cricklewood, Wembley, OOC/ Park Royal and the Great West Corridor, whilst also providing connectivity to support Southall, Colindale/Burnt Oak and Heathrow by interchange. The role of agglomeration benefits has been well established for the WLO, in linking these growth areas and their sustainable housing and commercial opportunities, with these wider impacts estimated at £16million per annum in additional productivity[96].

The growth areas within Barnet are particularly underprovided in terms rail connectivity with other growth areas and town centres in West London. Whilst the Overground network provides some connectivity between growth areas in Brent and Hammersmith and Fulham, these do not extend to connect into Hounslow. The scheme will improve PTAL particularly around Neasden, Harlesden, Acton Central and South Acton. The WLO would provide a wider strategic role in improving accessibility to other parts of London and key centres across the metropolitan region.

Since its initial proposal, TfL produced an Options Assessment Report in November 2020 to assess if there were other schemes that could deliver the required benefits for the WLO corridor. The assessment considered a long-list of options across heavy rail, London Underground, light rail, bus rapid transit (BRT), enhanced bus, interchange, highway capacity, walking and cycling and policy options. An eight option short-list was identified, where other options were excluded given the assessment, for further analysis. The short-list was composed solely of heavy rail options which had performed best with the most effective use of existing infrastructure, the highest levels of connectivity improvement and value for money. These were:

Options that most closely follow the Mayor's Transport Strategy proposal (above), with use of the Dudding Hill freight line for new passenger services and connecting to the north via Dudding Hill Junction and via Acton Wells, Old Kew and East Kew junctions to reach the South Western Hounslow Loop:

- Heavy Rail 2 – Heathrow to Wembley
- Heavy Rail 3 – Heathrow to Brent Cross
- Heavy Rail 4 – Heathrow to West Hampstead
- Heavy Rail 5 – Heathrow to Colindale

Options that reflect shorter alternatives of the heavy rail options 1-5 as 'WLO Lite'.

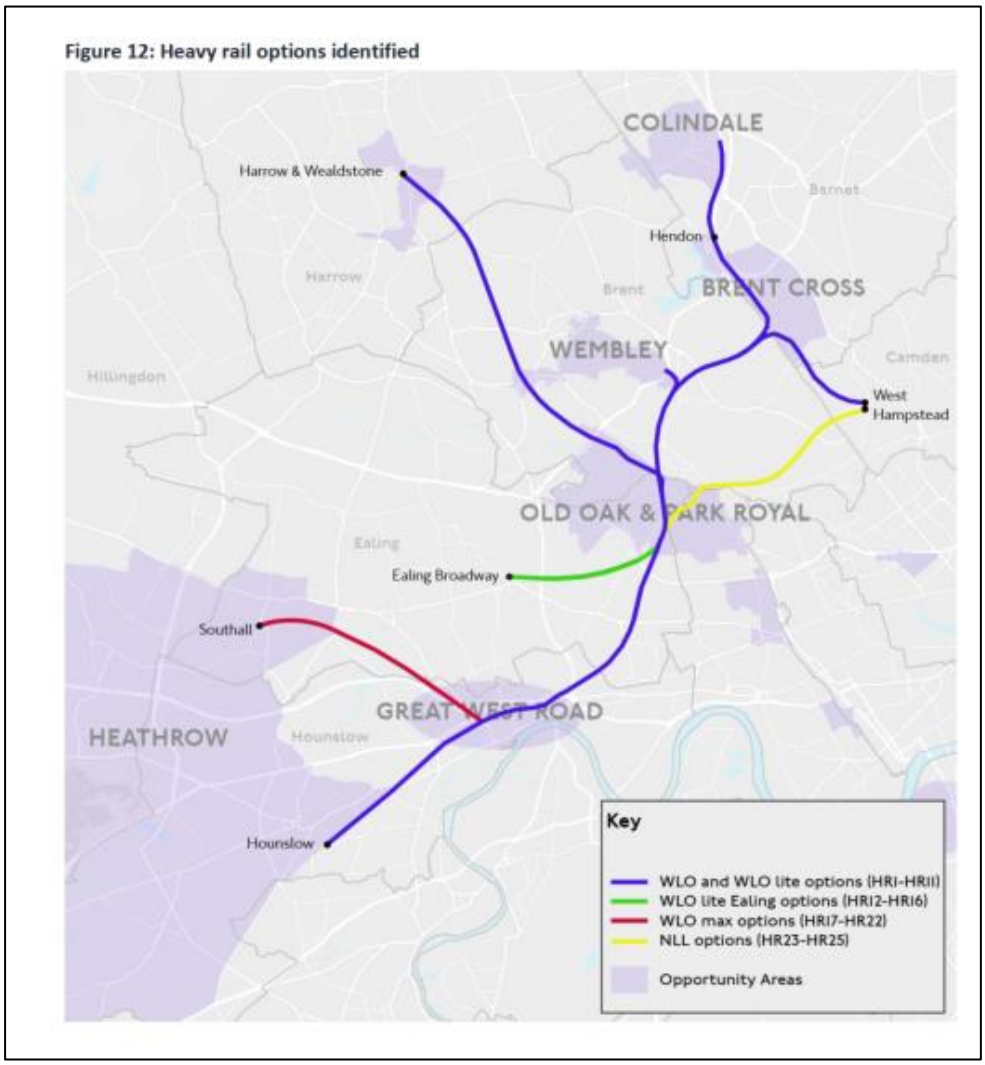
- Heavy Rail 6 – Old Oak Common to Heathrow
- Heavy Rail 9 - Old Oak Common to Brent Cross
- Heavy Rail 10 - Old Oak Common to Colindale
- Heavy Rail 11 - Old Oak Common to West Hampstead

The figure below presents the full set of the heavy rail options, with the short-listed options reflected by the blue route (WLO and WLO Lite HR1-HR11). The short-listed options will utilise only one of the proposed northern branches – to Colindale or West Hampstead – or in the case of HR4, HR6 and HR9 neither of these branches.

The Options Assessment Report shows that the WLO is the best option for the corridor, confirming earlier work commissioned by the WLA.

[96] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020

Figure 4-5 Options Assessment Report – Heavy Rail Options



Source: Options Assessment Report, TfL (2020).

The enhanced connectivity, accessibility and capacity will increase development potential around WLO stations, enabling additional development to take place and at a faster rate. This development impact could be enhanced where station based Masterplans are developed to maximise the accessibility benefits and create effective places[97].

The WLO Economic Development Narrative Report (2020) assessed housing development potential as dependent development within 1km of the stations with engagement with the LPAs. This showed that the WLO could have a substantial impact on housing development along the corridor, significantly improving the schemes value for money. The following table sets out the assessed dependent development by station area, covering following West London boroughs:

Table 4-4 - WLO housing development potential assessment by borough

WLA Borough	WLO dependent development

[97] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020

Dependent housing units verified by Local Plan process – 1km catchment	
Barnet	2,761
Brent	2,097
Hounslow	4,289
OPDC	0
Sub-total	9,147
Ealing – Acton Central and South Acton	3,215
Additional sites	
Additional sites outside 1km	2,991
Retail to residential within 1km	526
Intensification of industrial sites	0

Source: West London Orbital: Economic Development Narrative – Technical Report, Steer Arcadis (2020) *The Ealing assessment is less certain at this stage. Industrial intensification has already been incorporated within several Local Plans and therefore is no additional dependent on WLO.*

There is also a substantial land value impact associated with the dependent housing identified and agreed (with £725m in residual land value and up to £2.2bn including a place premium arising from higher land values and the value of accelerated delivery). The largest impact for land value is expected from the 'place premium' potential surrounding stations and the accelerated housing delivery resulting from the WLO scheme. Employment sites are considered to be supported by the WLO and come forward more quickly.

Overall, the assessment concluded: *'The WLO would contribute materially across a range of areas to help support local and regional objectives within the corridor. Moreover, the combined effect could increase economic and social interaction and opportunities across the corridor, serving to foster a stronger and more cohesive sense of place for this part of West London as a whole.'*

Interactions

- Interchanges can be made at Old Oak Common onto the Elizabeth Line, further connecting to Southall Opportunity Area and Hayes and Harlington
- New Brent Cross West station with service links
- Proposed Brentford-Southall link, where a new Brentford station is linked to Southall

Estimated cost and funding

The earlier WLO proposal estimated a capital cost of £265m. This will be updated as planning, design and timeline elements are refined. The TfL OAR did not specify the option specific costs but heavy rail was deemed to be in the £250-500m range. The latest central estimate for the WLO, as both capital and development costs, is £483.7m.

The most feasible funding options will need to be determined and combined where appropriate. Considerations of development-related finding include CIL, planning obligations and s106, and public sector development where the resources are available and a common strategic policy framework can be used. Tax increment options include business rates retention, Stamp Duty retention and a Workplace Parking Levy.

Proposed timeline

The earlier proposed timeline was for 2024-29, where the route could start operation in 2026, for West Hampstead to Hounslow services. The original phasing has been refined for a 2029 start.

The WLO Project is currently at an early GRIP2 stage. TfL is now considering the next steps for taking forward the short-listed options to develop the scheme and its funding strategy.

SIDP specific recommendations – for orbital rail connectivity

Brent currently has a lack of rail access to the rest of London, where the WLO station at Neasden sits to the south east of the Wembley Opportunity Area, and it will be important that Neasden has the

capacity and multi-modal access to accommodate its planned growth of 2,000 homes alongside Wembley and West Brent growth.

It is recognised that further benefit for West London from the proposed WLO route would be available where Harrow and Hillingdon are also linked into this orbital route. Hillingdon will benefit from the Elizabeth Line access, though northern parts of the borough with low PTAL (including Uxbridge) should be better connected to Hayes and Harlington for further access using the Elizabeth Line to Heathrow, Ealing and into Central London.

There would be higher costs per km of any additional route where existing rail line is not available to be used. Beyond the longer-route WLO short-listed options (HR2-HR5), alternatives should be provided including express bus access to the Elizabeth Line and WLO stations. A potential link to Harrow from the Elizabeth Line has also been identified as an opportunity to provide better connectivity between Harrow and wider West London. (see below – further links via the Elizabeth Line and WLO).

4.2.4.2. Willesden Junction interchange

Rationale and proposals

To accommodate future growth within Old Oak, where modelling indicated demand uplifts from OOC/Park Royal development of over 100% in AM peak and 150% in the PM peak by 2025. The station is intended to act as a destination within the Old Oak area with a set of station elements that have undergone feasibility at the GRIP2 level[98], these include:

- Multi-modal facilities in close proximity – bus, cycle parking
- New entrance for major development to south in Old Oak
- Deliver capacity and public realm improvements early in order to enhance the viability of adjacent development plots
- Step-free accesses to the station
- Link over the West Coast Mainline for vehicle access and access to WCML platforms in future

There is potential for over and adjacent site development, which the feasibility options support.

Interactions

- HS2 operation, with Old Oak Common
- East-west pedestrian and cycle routes passing the station, Wembley-Willesden healthy streets
- Freight facilities and provision at Willesden Junction

Estimated cost and funding

An estimated cost of £33m[99].

Proposed timeline

2021-27 to support OOC/ Park Royal development site viability and the increasing uplifts in the medium-term.

4.2.4.3. North Acton station enhancement

Rationale and proposal

To enhance accessibility and capacity of North Acton Underground station for Central line services. Demand has risen in recent years[100] and modelling shows further demand to 2040 (beyond the Elizabeth Line impact on demand), there is a need to accommodate the scale of development at OOC/Park Royal and jobs access at Park Royal from wider West London as well as other sites catalysed by HS2.

Further, connectivity to the station can be enhanced with provision of a new bridge link to the north and improved bus access. There is also potential for over site development.

[98] *Willesden Junction Station Feasibility study*, Atkins, Weston Williamson & Partners (2017)
[99] *OPDC Infrastructure Development Plan,* Old Oak and Park Royal Development Corporation (2018)
[100] *North Acton Station Feasibility Study*, TfL (2018)

Interactions

- Old Oak Common transport hub
- The provision of a pedestrian bridge over rail tracks to link to the HS2 site to the north is considered as a future addition, which will add cost.

Estimated cost and funding

Estimated £30m[101], to be met by OPDC, TfL and developer contributions. There may be a need to consider other funding streams, such as a Park Royal Workplace Parking Levy.

Proposed timeline

2021-23

4.2.4.4. OOC/ Park Royal enabling and growth transport works

A series of transport schemes have been identified through the OPDC IDP (2021) for transport, with items that have been deemed 'necessary' in the IDP. These schemes enable the significant development of homes and commercial space and those that support the development's future growth. These include the Willesden Junction and North Acton station works, with a particular wider West London role, these schemes are critical in meeting the indicative growth for OOC/ Park Royal.

These schemes are packaged as rail, road, cycling and pedestrian and bus network items.

The full details of these are provided in the OPDC IDP (2021) and are summarised below.

OOC/ Park Royal rail package

Centred on the committed Old Oak Common station transport hub, and with potential enabling rail to meet demand and release sites including Old Oak Common Lane to connect to the North London line. Old Oak Common Lane Station on the North London Line is deemed necessary to OPDC growth and is safeguarded in the Local Plan with a delivery timeline for 2020-2030. This may be looked at again and require additional platforms to facilitate the WLO but it has been deemed to not be necessary for growth. A Hythe Road Overground station on the West London line is now not being taken forward.

Beyond the Willesden Station works and North Acton Station works, improvements and enhanced access are necessary for Harlesden, Stonebridge Park and Park Royal stations.

A Chiltern Line Extension to Old Oak Common Station has also been recognised as being desirable for the medium to longer-term (years 11-20).

The total cost for these schemes beyond Old Oak Common are in the region £60m+ for necessary schemes and £235m+ including Old Oak Common Lane Station and Chiltern Line Extension.

Delivery will be required to be in place for key site development, through to 2038.

OOC/ Park Royal road and active model package

A number of cycle and pedestrian works have been set out, including bridges connecting Old Oak Street to Wormwood Scrubs and an Old Oak Street bridge over the WCML; a bridge from HS2 to the canal towpath and onto Scrubs Lane; linkages between the stations, industrial estates, along the Grand Union Canal, and to new development sites including Acton and reducing severance across the A40. A bridge connecting Old Oak Common Lane from HS2 to the North Acton area is needed and is anticipated to unlock development and as part of a future station link.

A number of the road works have included the delivery of high quality pedestrian and cycle routes.

Key road works include Park Bridge (multi-modal); Channel Gate Street road network and links; underpasses for the West London Line; bridges and links over Grand Union Canal and Old Oak North; Victoria Road capacity and junction works with the A40 and A406.

The total cost for these schemes deemed necessary is estimated at £100m+.

Delivery will be required to be in place for key site development, through to 2085.

OOC/ Park Royal bus network package

New bus routes and infrastructure (bus stops, bus stands, maintenance facilities, bus priority and bus only routes) are the central element alongside the extension of current services and with bus support

[101] *TfL Feasibility Study,* TfL (2018); *Ealing Local Implementation Plan 3,* LB Ealing (2019)

during construction. East to West connectivity with buses is a key element and supports access for all three boroughs (Brent, Hammersmith and Fulham and Ealing).

The total cost for these necessary schemes is estimated at £35m+.

Delivery will be required to be in place for key site development, through to 2038.

4.2.4.5. Brentford-Southall rail link

Rationale and proposal

To provide a better orbital connection within West London without having to go central. This link would serve passengers between a new station in Brentford and Southall, utilising the existing freight rail line. It would likely include:

- A new station at Great West Road
- A direct interchange to the Elizabeth Line (Heathrow, central London, Reading), Great Western Railway (Paddington, South West, Reading and west)
- A potential active mode link to the proposed WLO route
- The potential to extend access over the A4 and to the existing Brentford station
- The scheme should ensure effective and active mode access between the new station and the existing Brentford station
- The scheme could also connect to the proposed cycling routes across the A4, with Brentford, Chiswick and Hammersmith, Olympia to Brentford, and Brentford to Hounslow[102].

This scheme would enhance the benefits to West London from the Elizabeth Line and the WLO. The link provides increased catchment area for the Great West Corridor across West London and further west[103]. The link would also provide better connectivity between Southall as a growth area of 9,000 homes and Great West Corridor with significant employment opportunities.

Network Rail is currently working through GRIP 3 activities to better inform the next steps for progressing a single option. The current project development work includes conducting site surveys, developing scheme plans that are acceptable to the industry, station siting and infrastructure siting

Interactions

- If a bridge is provided over the A4 there can be a link between West London Orbital with existing Brentford station, which provides current South Western Railway services linking to Hounslow and Waterloo.

Estimated cost and funding

Estimated range of £60-100m[104]. DfT and developer contributions, where a Workplace Parking Levy is being explored as one funding approach with TfL. The link to Brentford Station is likely to be of a high cost and may not be included.

Proposed timeline

Previously identified with a potential 2022 start for 2026/7 operation, this may need to be updated.

4.2.4.6. Colindale station enhancement

Rationale and proposal

There has been notable growth in demand on the Northern Line at Colindale Underground Station in recent years, which will significantly increase through to 2040 with the growth at Burnt Oak and Colindale OA. Alongside a new station building, with lift and step free access and public realm improvements, new homes are proposed to be delivered either side of the station[105].

Interactions

[102] Proposed to be delivered between 2021-/24 as part of TfL Cycling Action Plan
[103] Hounslow modelling has estimated over 1,000 people would use the service in the morning peak.
[104] *Ealing Local Implementation Plan 3,* LB Ealing (2019); *Hounslow Local Implementation Plan 3,* LB Hounslow (2019)
[105] TfL Colindale station redevelopment outline application to Barnet, approved subject to conditions, March 2020

- Northern Line capacity improvement proposals, with Bank Station having greater capacity by 2022 and plans to increase the capacity at Camden Town, facilitating more frequent services[106].

Estimated cost and funding

An estimated £22m[107]. Barnet has secured investment with developer contributions and TfL, where this may need to be confirmed in light of the current funding situation.

Proposed timeline

2021-2023, in advance of significant development around Colindale and as per s106 agreements.

4.2.4.7. Harrow and Wealdstone station upgrade for additional services

Rationale and proposal

Upgrade to support accessibility and active mode arrival, given growth centred at Harrow and Wealdstone OA, with access to Bakerloo, Overground and West Coast Mainline. Cycle facilities and parking should also be provided[108]. Potential additional services through the WCML (identified by Network Rail) can be accommodated in the future to improve local connectivity and links to Wembley. Infrastructure requirements to address any resulting capacity pressures will need to be assessed. There is also a proposal to uplift and extend Bakerloo services on the DC lines beyond Queen's Park up to Harrow and Wealdstone, though this at an early stage of maturity and again potential infrastructure needs would need to be assessed.

At this point in time Harrow and Wealdstone is not a high priority for capacity increases[109], so this is a longer-term scheme and would be a response to demand growth for station access and additional stopping services for local connectivity.

Interactions

- Four Lines Modernisation programme, with increased reliability and 28 trains per hour by 2023 on the Metropolitan Line
- Potential Harrow links to Old Oak Common for the Elizabeth Line, future WLO extension or express bus route to OOC from the station

Estimated cost and funding

An estimated £10m[110] for station works. Further consideration is needed to accommodate additional services through the WCML.

Proposed timeline

To ensure station is enhanced as Harrow and Wealdstone Opportunity Area development progresses. To enable future additional services, the estimated timeframe for new WCML services is for 2029 onwards.

4.2.4.8. Harrow on the Hill station enhancement

Rationale and proposal

Better two way access for buses, better pedestrianised access with public realm and station frontage. The modernisation of the station, with new lifts and platform improvements, is underway. These upgrades are linked with housing development in the vicinity.

With proposed development around the station, a new bus station on College Road is proposed to address current capacity and constraints. This would improve access to Chiltern railways for Marylebone, the Metropolitan Line, as well as bus connectivity including Harrow and Wealdstone, Barnet (Mill Hill, Brent Cross, Edgware), Northwick Park Hospital, Kenton and Wembley.

Interactions

[106] The Mayor of London's Transport Strategy suggests the Northern Line could carry 54,000 additional passengers a day if capacity was increased to 30-32 trains per hour
[107] *Barnet Growth Strategy,* LB Barnet (2019)
[108] Network Rail also have a current scheme to re-provide the car park at Harrow underneath oversite development
[109] SIDP engagement: Network Rail (November 2020), third party discussions
[110] *Strategic Infrastructure Delivery Plan input*, LB Harrow (2020)

- High street and town centre improvements, in advance of Station Road investment and St Anne's Road pedestrianisation.

Estimated cost and funding

An estimated total of £25m[111], including developer contributions.

Proposed timeline

To ensure station is enhanced as Opportunity Area development progresses, 2022-25.

4.2.4.9. Gunnersbury station capacity upgrade

Rationale and proposal

Gunnersbury is a key station within the Great West Corridor OA, providing interchange between the district line and London Overground. This scheme supports effective access between the GWC and Old Oak and Park Royal areas, and up to Wembley, with step-free access and station capacity enhancements to be worked through with TfL. There has been increasing demand for access and capacity[112] for the station and its services, which is expected to be further required with GWC development.

Interactions

- Impact of proposed WLO stations at Brentford and Lionel Road on station demand

Estimated cost and funding

Cost estimated at £25m[113], expected through borough, TfL and developer contributions.

Proposed timeline

2025-2030

4.2.4.10. Wembley access improvements and rail service accommodation

Rationale and proposal

Beyond committed schemes around the streets' layout, junctions and active mode proposals for the Wembley area, these improvements cover a new bridge over the Metropolitan Line to serve pedestrians and cyclists, the linking of open spaces and improving Great Central Way access and junctions to address barriers and congestion especially on Wembley event days.

This is important to facilitate growth at Wembley as well as growth at Alperton, Neasden and around Church End. There is an opportunity to utilise the Wembley to Willesden cycling route and Wembley Hub cycle route enhancement to provide accessible, appealing and continuous routes through Wembley Opportunity Area as a permanent cycle network linked to other West London areas (4.2.4.17).

Further, potential future additional services through Wembley Central on the WCML (as identified by Network Rail) will need to be accommodated. Further infrastructure may be needed to address any future capacity pressures.

Interactions

- Redesign of the Wembley Triangle on High Road, connecting to the town centre with cycle lanes (£5m committed and funded)
- Wembley committed and developer funded road and active mode works

Estimated cost and funding

Great Central Way improvements have been estimated to cost £12m[114] as an important element to facilitate growth at Wembley. This will undergo feasibility with TfL on options for sustainable provision, and to ascertain the developer contributions. The committed schemes at Wembley do include a notable funding gap for the Wembley Olympic Way pedestrian access.

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[111] *Infrastructure Development Plan*, LB Harrow (2012) *and Strategic Infrastructure Delivery Plan input*, LB Harrow (2020)
[112] *Local Implementation Plan 3,* LB Hounslow (2019) and *Strategic Infrastructure Delivery Plan input*, LB Hounslow (2020)
[113] *Local Implementation Plan 3,* LB Hounslow (2019)
[114] *Local implementation Plan 3,* LB Brent (2019); *Infrastructure Delivery Plan*, LB Brent (2019)

Proposed timeline

Wembley access improvements 2022-26

Accommodation of additional Wembley Central stopping services through the WCML for 2029-31.

4.2.4.11. Uxbridge Central Line extension

Rationale and proposal

To improve connectivity with Ealing, where, for example, the underground route from West Ruislip to North Acton (for Park Royal) is just 18 minutes but Uxbridge has a much longer route.

This upgrade would provide a spur adjacent to Ruislip depot between Ickenham and Ruislip Gardens.

Interactions

- Deep Tube Upgrade Programme by TfL

Estimated cost and funding

Costs will need to be estimated, where a latest position is not currently available from TfL.

Proposed timeline

From 2025, to support emerging plans for growth in surrounding area of Hillingdon.

4.2.4.12. Further connectivity via the Elizabeth Line and WLO links

There is an opportunity to provide sustainable connectivity between the West London growth areas, using links to the Elizabeth Line and WLO stations. This would enhance the economic growth potential and distribution across West London. These linkages should be considered for where they will help unlock wider development and improve access to jobs. Section 4.2.2 sets out the areas with limited connectivity between them and some remain with the implementation of the WLO, including: OOC/ Park Royal to Harrow and Uxbridge, and Wembley to Southall, Great West Corridor and Heathrow.

Key proposals within this theme are presented below.

Rationale and proposals

1. Greenford Line enhancements – for Northolt and wider connectivity

This would involve increasing services between Greenford (Central line access) and West Ealing on the Great Western Main Line and onto the Elizabeth Line, where there are currently two trains an hour and no Sunday service. The rationale is to enhance the Elizabeth Line accessibility benefits within Ealing by raising PTALs in currently low PTAL areas and to provide the connectivity to support the growth opportunity at Northolt. This would provide a radial link in to enhance connectivity to OOC/Park Royal, Southall and Heathrow.

Network Rail is aware of aspirations for increasing the service provision on the Greenford branch, through engagement with stakeholders on the London Paddington to Reading Corridor Study[115]. Proposals will be considered in consultation with stakeholders and through the production of the strategic outputs of the corridor study.

2. Harrow Elizabeth Line spur from Old Oak Common

Harrow and Wealdstone currently has poor connectivity with OOC/ Park Royal, Hounslow and Heathrow, with significant variations in car and public transport travel times to Heathrow now and in the future[116]. Connecting Harrow and Wealdstone Opportunity Area to Old Oak Common would open up access to OOC/ Park Royal and through to, Southall, the Great West Corridor, west Hounslow and to Heathrow.

It is suggested that a disused rail line could be utilised for this link. An alternative would be an express bus route. These will need to be explored for their longer-term case in response to growth. This scheme links to the Harrow and Wealdstone station upgrade as well as future potential WCML services.

3. Wembley access to the Elizabeth Line and via WLO

[115] SIDP engagement: Network Rail Western Strategic Planning (October 2020)

[116] *West London Transport Infrastructure Constraints,* Regeneris and Systra (2017)

The WLO could provide Wembley and Alperton growth area and areas of low PTAL in Brent access to other West London growth areas via Neasden or Harlesden stations, where these WLO stations should be made accessible to a wide catchment area. There is scope for connecting Wembley and east Brent to Neasden station and surrounding development, Harlesden or Brent Cross for WLO services and interchange onto the Elizabeth Line at Old Oak Common through to Ealing, Hillingdon and Heathrow.

This link could be met with express bus services and cycling routes (see schemes x and x).

A more significant scheme option is an extension of the Elizabeth Line along the West Coast Mainline at Wembley Central[117], as well as West Coast Mainline platforms to be reinstated at Willesden Junction to provide an HS2- Elizabeth Line interchange. At present these are not being taken forward, but they may reflect an opportunity within the 2030-40 time period especially as Wembley Opportunity Area and OOC/ Park Royal continue to grow.

4. Uxbridge access to Hayes and Harlington

The provision of the Elizabeth Line provides notable[118] improvements in job access for Hayes but Uxbridge continues to have significant variations in car and public transport travel times to Heathrow. This would interact with the proposed Uxbridge Central Line extension as well as committed work to improve Uxbridge bus station.

This link could be met with express bus services and cycling routes (see schemes further below)

5. Mill Hill and Finchley growth areas to be made accessible to either Hendon, Brent Cross or Cricklewood for WLO access

This link could be met with express bus services and cycling routes. (see schemes further below)

Estimated cost and funding

- Greenford service extension, for greater frequency than current services, would need to be operationally costed.

  If such a proposal were to be recommended as part of the outputs of the London Paddington to Reading Corridor Study, further work would be required to assess the requirements to deliver the service, cost estimates and the seeking of funding as appropriate[119].
- Elizabeth Line spur from Old Oak Common to Harrow and Wealdstone could reflect a significant cost which will need to be explored, in advance of existing station works (0) and with potential WCML services in the future.
- Aspects of schemes 3-5 are included in West London cycling and express bus routes schemes further below.

Proposed timelines

- Greenford enhancement potential - medium-term
- Harrow Elizabeth spur to Old Oak Common - longer-term
- Wembley access to WLO stations, as WLO developed and in advance of operation, and further Wembley Elizabeth Line links - longer-term
- Uxbridge access to Hayes and Harlington, as the Elizabeth Line becomes operational – medium-term
- Mill Hill and Finchley access to WLO stations in Barnet, as WLO developed and in advance of operation – longer-term

4.2.4.13. A406 Corridor improvements

Rationale and proposal

The A406 has extensive private vehicle traffic and congestion, alongside freight movements, with air quality and noise issues. Delay issues exist at the junctions with the A1, A4, M1, A5 and around Brent Park. The A40 to M1 section is the busiest, but with poor journey time reliability from Kew Bridge to

[117] *Local Implementation Plan* 3, LB Brent (2019)
[118] *TfL West London Sub-regional Transport Plan* (2016 update) – 2011-31 change in access to jobs from public transport
[119] SIDP Engagement: Network Rail (October 2020)

the A404[120]. This corridor is a critical link, and in places a barrier or development challenge, for strategic growth site across West London: the Brent Cross/ Cricklewood, Wembley, OOC/ Park Royal and Great West Corridor OAs, as well as Alperton, Finchley, West Brent and Acton growth areas.

Corridor improvements to include pedestrian and cycle bridges to address severance; improvement in pedestrian and cyclist routes and safety; sufficient sustainable mode access to and between development areas; and junction works to address flows.

Cycling routes and bus improvements should be included between Wembley and Brent Cross/Cricklewood and Colindale/Burnt Oak to the east (see cycling and express bus route schemes).

A proposal for tunnelled sections, including around Ealing Common, requires feasibility testing.

Interactions

- Extension of Ultra Low Emission Zone (ULEZ) to A406
- A5 corridor works
- M4 Junctions Smart motorway
- Brent Cross West Thameslink – with sustainable travel bridge over the A406
- Healthy streets corridors e.g. Wembley to Willesden

Further, this scheme could be linked to **digital infrastructure** needs including consideration of cross-boundary provision of full fibre infrastructure and smart street furniture as part of improvements to serve the surrounding areas.

Estimated cost and funding

Corridor works have been estimated at £100m[121]. Feasibility works with TfL, considering developer contributions, would be a next step.

Proposed timeline

Works to be phased considering development trajectory need and mitigation with potential improvements from 2022-35.

4.2.4.14. A5 Corridor improvements

Rationale and proposal

The A5 corridor provides strategic links to A406 at Staples Corner and the A407 for Cricklewood, as well as roads linking development areas where junction improvements are proposed. The corridor contains two Opportunity Areas and links growth at Edgware, Burnt Oak, Colindale, West Hendon, Brent Cross and Cricklewood, supporting intensification at Edgware and Colindale as well as the destination potential of Brent Cross, and to proposed growth to the East of Brent with Neasden in particular alongside Staples Corner and South Kilburn.

Sustainable travel improvements on this corridor would support better interaction between residential, employment and leisure centres within Barnet, Brent and Harrow, with Wembley and Brent Cross as key points, reducing the barrier to cross-boundary movement and improve air quality.

Proposal elements:

- Kilburn to Edgware cycling route provision, as identified by TfL's Strategic Cycling Analysis
- Priority bus route and stops, as part of Ultra Low Emission Zone
- The corridor should ensure cycling route links to those through to Wembley and Brent Cross onto Edgware and east to Finchley, requiring cycle facilities and parking at development sites.
- Support access to WLO stations from Colindale/ Burnt Oak and Edgware
- Cross-sector recommendation: **green infrastructure** provision within the area can be better linked from the corridor, with the capital ring, Welsh Harp open space, Brent reservoir and West Hendon playing fields.

[120] *West London Transport Infrastructure Constraints* (2017), Regeneris and Systra

[121] *Local Implementation Plan 3,* LB Brent (2019)*; Strategic Infrastructure Delivery Plan input from transport long-list,* LB Ealing (2018)

- Cross-sector recommendation: digital link - consider provision of **smart street furniture and full fibre as an integral element** of improvements

Interactions

- Outcomes of A5 corridor transport study and studies on corridor development heights
- Consolidated freight consolidation centres to reduce freight traffic along the corridor
- Place-making at Brent Cross, the town centres with Liveable Neighbourhoods and Healthy Street initiatives, and the committed and planned station developments at Brent Cross West and Colindale improvements
- A406 North Circular road improvements
- Proposed WLO stations of Brent Cross, Cricklewood and Neasden (depending on option)

Estimated cost and funding

Estimated at £10m for initial corridor improvements[122], these are part funded. Further SIDP proposed improvements to ensure the growth area has sustainable travel linkages would need to be costed.

Proposed timeline

Not currently specified, should be considered in-line with development trajectory at the linked growth sites to mitigate/ avoid traffic pressures and embed sustainable travel behaviours.

4.2.4.15. Hammersmith Fly-under

Rationale and proposals

This is an aspirational scheme to replace the A4 flyover with a tunnel scheme. This would help better link the town centre to the river, improve air quality, support pedestrian and cycling linkages through the area and release land for residential, commercial and public space development. Options have been explored previously with TfL as part of 2015 feasibility work, including the return to two-way working at the Hammersmith gyratory, allowing possible pedestrianisation of the western leg[123]. The Hammersmith Town Centre planning that is underway will provide further clarity on the rationale and feasibility on this option.

Interactions

- West London cycling network
- M4 and Great West Road

Estimated cost and funding

Dependent on scheme option, with shorter (1 mile) and longer (2.5 mile) tunnel options which may require significant funding from what can be raised from development. Range £220m – 1.7bn.

Proposed timeline

2030-40, based on feasibility of scheme.

4.2.4.16. Great South West road/ Parkway combined works

Rationale and proposals

Upgrade and redesign to this part of the road network is important given the significant growth across Hillingdon, Ealing and Hounslow, with the growth areas of Hayes and Southall in close proximity as well as Feltham and the West of Hounslow. These works support improvement for local air quality with further traffic pressure from future development, through congestion reduction and facilitation of active mode travel.

The schemes should include improved pedestrian facilities and ensure cycling severance is addressed and access improved, whilst protecting blue-green infrastructure in close proximity. These improvements would also facilitate improved bus routes between the noted Opportunity Areas.

The scheme works include:

[122] *As per Barnet Local Implementation Plan 3 and Brent Local Implementation Plan 3 (2019)*
[123] *Local Implementation Plan 3*, LB Hammersmith and Fulham (2019)

- the Clockhouse Road bridge and roundabout – optimise the Bedfont Junction with grade separation and with severance reduction to improve cycling access
- the A4/A312 at the Jolly Waggoner's roundabout – reduce congestion at A4/A312 and improve local travel times
- the Bulls Bridge Roundabout – redesign and rebuild with capacity improvements
- Southall East Bridge – linking to Great West Industrial Estate
- Wider severance reduction with bridge enhancements to support active travel corridors

Interactions

- M4 J1-3 smart motorway
- Wider committed road improvements along A40, A312 and A4 including resurfacing, bus stop accessibility and pedestrian facilities[124]
- Strategic green infrastructure– Bedfont Lakes Country Park, Cranford Park and Minet Country Park, Grand Union Canal and River Crane to be protected in their quality and access
- Canal and River Trust towpath improvements along the route

These schemes also help facilitate the potential need for future upgrades for Heathrow sustainable access, such as a Southern Road tunnel (with restricted access).

Estimated cost and funding

The works total is estimated at £150m, covering the schemes and programmes listed above (Clockhouse £25m, Jolly Waggoner's £30m, Bulls Bridge £20m, South East link bridge £40m, Severance reduction £30m[125]), with further cost where active mode provision improvements. Through borough, TfL, developer contributions.

Proposed timeline

Initial works for Bulls Bridge capacity driven by Southall Gasworks and Hayes developers by 2022. 2022-30 for following works.

4.2.4.17. West London Cycling Network

Rationale and proposals

There are a great deal of cycling routes proposed from the TfL Cycling Strategy Plan through to borough local plans and proposals. The SIDP focusses on strategic needs for cycling infrastructure, considering the Opportunity Areas, linkages between residential and commercial centres and strategic transport hubs. Current areas of low PTAL are an important consideration, where cycling access to stations can be critical for those residents alongside decongested bus access.

Accessible, convenient, appealing cycling routes, supported with facilities, can provide a step change in active mode use and transform congestion and poor air quality hotspots. Further, these routes can reduce the need for car parking provision at residential and commercial development and enhance the quality of place offer across West London.

The following present identified strategic cycling need priorities, including those identified by TfL (Section 4.2.3.1) and those that can address connectivity challenges between West London's growth areas (Section 4.2.2):

Key West London spine:

- Development of Cycle Superhighway 9 for West Kensington, Hammersmith, Chiswick and Brentford to provide connectivity between Great West Corridor and Hammersmith and Fulham as a 9km route, and with extension from Brentford to Hounslow Town as 6.5km route. This highway also provides the access to and between several proposed WLO stations.
- Shepherd's Bush to Southall, following the Uxbridge Road and Broadway corridor

[124] TLRN maintenance and enhancement £10m for 2020-26, according to *Hillingdon Strategic Infrastructure Plan* (2017)

[125] *Strategic Infrastructure Plan,* LB Hillingdon (2017), *Local Implementation Plan 3*, LB Hounslow (2019), *Local implementation Plan 3*, LB Ealing (2019). Bulls Bridge Roundabout including developer works; Jolly Waggoner's roundabout; Clockhouse Road bridge; severance reduction programme

- Fulham to Wembley, following Fulham Palace Road, through Shepherd's Bush and up Scrubs Lane onto Wembley
- A5 corridor route through to Edgware and linking Brent Cross/ Cricklewood and Colindale/ Burnt Oak, linking to the Dollis Valley greenway and proposed Barnet Loop
- Future routes from Superhighway 9 at Brentford on to Heathrow, with requirements to be assessed
- Grand Union Canal cycleway improvements

Local centre connections, including Growth areas and stations:

- Routes between Harrow Weald and Wembley to connect these growth areas with a strategic cycle route
- Routes between Brentford in West of Hounslow through to Olympia, as a key spine for growth area linkages, and from connected Hounslow points to Heathrow via Feltham and Bedfont
- Routes between Greenford and Southall to central Ealing to support areas of low PTAL including Northolt
- Routes between Brent Cross and Wembley
- Routes between Hounslow and Hayes
- Wembley Opportunity Area access to the WLO, linking to the Wembley Willesden Healthy Streets improvements via Stonebridge and Harlesden (WLO station)
- Uxbridge route to Hayes and Harlington, to provide access to the Elizabeth Line – as a 5-6km route using the Grand Union Canal south to West Drayton and onward using Crowley Road or the High Road.
- Segregated cycle routes and a safer cycle pathway through Hammersmith and Fulham's key roads covering Uxbridge Road, Hammersmith Road, Wood Lane, Shepherd's Bush and Fulham Palace Road

A recommendation for a West London cycling network, and for enabling sufficient modal shift, is to also focus on facilitating shorter and more local cycling routes - for schools, local jobs, retail and leisure, and green space access – beyond a focus on radial routes. This will require coordination across West London boroughs, with TfL, developers and businesses, to a) identify and direct resources to these local needs and b) support changes in local trip travel habits, which can serve a wider population of potential cycle route users. A local centre hub and spoke approach could be developed.

Estimated cost and funding

Cost rates between £250,000 per km for more straightforward routes and up to £2m per km for segregated cycle lanes would drive a significant cost scale. Additional costs for specific facilities at stations and job hubs, where bridges are required with (some multi-modal bridges recognised elsewhere) as well as those other the Grand Union Canal. This would need to be fully costed with a timeline to effectively meet key growth and station delivery.

Proposed timeline

Phased programme to coordinate for key development site delivery to facilitate the embedding of new travel behaviours and in advance of new station services and access as demand increases. The original timeline for TfL's strategic route priorities ran to 2024. West London wide strategic cycling infrastructure to be provided for 2024 where possible given growth and station timeline priorities, and to continue beyond as required.

4.2.4.18. Express bus routes and bus rapid transport

Rationale

Express bus and rapid bus transit (BRT) network options offer potentially cost effective solutions for areas of poor within-West London connectivity, recognising the scale of housing development and job opportunities (and business access to the labour market). The Mayor's Transport Strategy also identified areas in West London that would benefit from demand responsive bus services, including West of Hounslow, North West Brent with the A5 corridor up to North Barnet and North Harrow, and North Hillingdon, and as demonstrated with areas of low projected PTAL in 2031 (Figure 4-2). BRT

networks can address areas of lacking orbital transport links, areas of high car dependency and where there are constrained links between growth areas.

Express bus routes can be considered alongside cycling schemes for growth area and station connections such as Wembley to WLO stations and Mill Hill and Finchley access to WLO stations proposed for Barnet.

Improved services will also be critical in the absence of southern rail access improvements to Heathrow (or in advance of this as a longer term response) such as from Feltham and Bedfont.

Linkages that may better suit BRT, as routes segregated from traffic and with network options with disused rail lines, include:

- Ealing to Brent Cross – the current public transport journey time is not competitive compared to car use[126]. This need reduces where WLO is provided.
- Wembley to Ealing via Old Oak Common – to become a more important link with the Elizabeth Line and access to Heathrow and Park royal alongside Wembley's growth as a commercial and leisure destination. This need reduces if Wembley is easily accessible to the WLO and connected to Old Oak Common in the future, as reflected in TfL's WLO Options work[127].

  Together these above schemes could combine for greater feasibility and benefit.
- Harrow-Hayes-Heathrow – potential BRT corridors have been considered for connectivity between Uxbridge and Hayes to Heathrow, where a broader option can link further to Harrow to maximise benefits from having a North-South radial link. These would provide orbital connectivity north of the WLO, relieving roads including the A312.

  Together, a connecting link between Wembley and Harrow via the A404 could provide a BRT loop through West London to cover the areas above. Such corridor approaches would need to be developed and assessed.
- Finchley to Finsbury Park, along the A406 or Ballard's Lane – a priority corridor for Barnet, using disused rail corridors, with other radial routes linking key destinations such as Hendon, Brent Cross, Finchley and New Southgate.
- Great West Corridor express bus service to Osterley, Kew and Gunnersbury station using the A4 – in progress outline business case with TfL.
- Bus transit hub at White Hart Roundabout and Northolt station with dedicated bus lanes.

Estimated cost and funding

The TfL WLO Options Assessment Report estimated cost scales for BRT and enhanced bus services, for Ealing to Brent Cross via Wembley a BRT was estimated in the £250m-500m cost scale. Heathrow to Brent Cross via Harrow was deemed unaffordable at £500m – 1bn.

Enhanced bus options had lower estimates of £50m-100m cost scales, whilst the longer route of Heathrow to Brent Cross was up to £500m. The latter two proposals listed above are shorter express bus services serving local growth areas and would be of a lower cost scale.

Proposed timeline

Phased programme to coordinate for key development site delivery and. There could be a prioritisation for quick wins through continuous corridors and express bus routes in advance of segregation, and with an emerging position on the WLO delivery to inform BRT corridors.

4.2.4.19. Electric Vehicle infrastructure – Transport, energy and digital need

In order to meet the future demand for EVCPs in West London, with its areas of high car dependency and significant logistics sectors, consideration must be given now to their roll out, their effect on the

[126] *West London Transport Infrastructure Constraints: Evidence Base,* Regeneris and Systra (2017) – connectivity matrix
[127] *WLO Options Assessment Report*, TfL (2020)

immediate distribution network and the power generation capacity. EVCPs can be split into two type of chargers, Domestic and Non-Domestic.

Domestic

Dedicated EVCPs s are not possible for the majority of domestic use. Further, faster chargers of 22kW and upwards require a three-phase supply (400V) and it is unlikely the disruption and cost of this upgrade would be commercially achievable, so for domestic chargers long charge times would be the norm. It is noted however, EV technology both on battery technology and respective chargers may reduce the recharge time, but currently this technology is not on the market.

To overcome this issue several councils have been rolling out a limited number of EVCPs, these are generally located on existing car parking bays or nominated parking bays for private multi tenanted flats. Ensuring availability to EV cars is proving difficulty to manage, with EV cars fully charged taking up the EV parking space.

Due to capital cost, electricity supply capacity, and disruption it is unlikely every marked and non-marked parking space in the West London growth areas could be provided with an EVC charger by 2035. It is likely that the number of existing parking bays provided with EVC chargers will increase though this will put a strain on the existing electrical infrastructure.

Alternatively, several of the UK's current fuel suppliers are converting current petrol forecourts to accommodate EVCPs, with one or two 22kW chargers provided. The use of the larger capacity charger reduces the recharge time down to around 1 -2 hours. To the west of Heathrow Airport one supplier has installed several 150kW rapid chargers, these can cut the charging time down to 30 mins, though at present only 20% (high end) of EVs can accept this rate of charge.

To provide this level of chargers the local District Network Operator (DNO) must install a dedicated electrical substation and ensure the feeding HV network can support this load. By reducing the re-charge times, a larger number of vehicles can use the EVC, reducing the need for individual chargers.

Further, a number of high street brands are installing EVC at their out of town centres, though limited to one or two EVCPs. Providing an EVC to every car parking space would be cost prohibited at this time, especially with the uncertainty though further Government legalisation may be introduced in the nearer term.

Non-domestic

The motor industry is currently behind in the non-domestic EV design / production when compared with domestic car use. EV vehicles are currently limited to black cabs, small and larger vans. By 2030 this is likely to improve with all types of non- domestic vehicles being available in EV versions. For example, both Royal Mail and British Gas have launched their own EV fleet with extensive EVCPs at their respective depots. Private fleets tend to have their own charging facilities at 22kW to 50kW. Due to their operational needs many of these vehicles are charged at night when they are not required to be used.

What is not available at present is electric-powered HGVs, due to poor current viability. Tesla have demonstrated a working version, but it is not available in the UK at present and due to the battery weight may not be viable. Current thinking is that Biofuels or Hydrogen may in part power these vehicles by 2035, requiring Biofuels / Hydrogen filling stations.

For the existing and proposed freight areas in West London, the uncertainty of the HGV EV technology and the roll out of the type of EVC is unknown. However, these developments may be accelerated by extension of the ULEZ to cover parts of West London. For planning purposes 150kW and 300kW chargers should be allowed for, with battery storage.

For a number of the larger EVC sites (10 chargers and above) the use of battery storage systems is currently coming onto the UK market. These store off peak electricity and provide power to the EVC during peak times. These can also be linked to PV / Solar farms for the more remote sites, where there could be good opportunities in West London with emerging solutions in Hounslow and Park Royal for example.

Infrastructure need

As the need for both domestic and non-domestic EVCP grows towards 2030 and beyond, the current electrical distribution network would need to have its capacity increased. Most of this work will be carried out by the respective District Network Operators (DNO) SSE and UKPN in West London. The

result of which will be an increase in the number of electrical substations and cables in the ground with the requirement to increase the capacity of the supplying HV network.

For new large developments in West London, predicted electrical demands must be included for the provision of EVCPs and the planning and strategy will depend on the provision requirements, considering parking capacity and nearby forecourts, and charger size. For terraced housing stock and multi tenancy housing, the number of EVC will be limited due to availability of space. It is envisaged charging for these EVs would take place in on-site parking EVC or Fuel Station forecourts, (charging hubs). For large domestic development areas, it is likely a change to the UK Building Regulations will be required, in order to require all new housing stock is provided with a 7kW or 22kW charger.

Another consideration is the actual uptake of EVs in West London. The planned provisions for public transport and cycling may mean that the number of EV vehicles will not increase beyond current car levels and may reduce[128]. For those journeys not well served by public transport, including the lack of orbital connectivity, and cycling the promoting and facilitating of EVs is ever more of a priority to enable the sub-region to shift from its relatively high current car use.

For non-domestic fleets the required infrastructure may be smaller than the domestic requirement, but this will have a larger effect on the supplying network due to locational EVC demands. Further, West London has a leading logistics role and therefore promoting and facilitating freight EVs is a priority for West London.

At this time EV technology is advancing at a rapid pace, so to future proof large development such as the Opportunity Areas, it would be prudent to install the required infrastructure and allow for the space requirements but not install EVCPs at the early stage of development. EVCs would then be fitted later with the current technology of the time.

The increase in infrastructure will also likely bring some disruption to the current highway network, as new infrastructure is installed.

Option: Rapid Super Charging Hub

The ultimate aim of the EV market is to provide EV vehicles at a similar cost to the current vehicles and be able to charge all EVs from empty to full within 10 minutes. If this can be achieved, it may remove the need for EVC domestic charge points, as most EV users would go to the forecourt option.

Consideration could be given in the Opportunity Areas to provide dedicated rapid super charging hubs, for example with 25 charging points rated at 350kW each. The developments can be complimented by retail and services, to be used whilst charging is taking place.

Rapid Super Charging Hub

Option: Induction Charging

By 2025 it could be possible to use induction charging systems to charge EVs, these comprise of an induction coil installed in the highway (parking space), the vehicle parks over the coil and is charged.

[128] For example, the strategy for Hackney is to install EVC only for the current car ownership levels.

Works will require collaboration with highways and the DNOs to increase network capacity to support this load. This is emerging technology that is not currently available in the UK.

Another consideration would be the use of the Vehicle to Grid function. Here the power in the EVs battery is removed and used to power the grid, dwelling or building (reducing energy costs), then recharging the vehicle when the vehicle is needed. This was particularly attractive to large scale parking at Heathrow Airport, where cars are typically left for 14-day periods.

Whilst the technology is available to make this happen, legislation is required by the UK Government to ensure no legal disputes develop over damage to the batteries and liability.

Induction Charging

4.2.4.20. Future of West London freight – Consolidation centres and Magway

West London's strategic location with advanced industry and freight routes and assets provide a comparative advantage in leading innovation in freight movements. A focus has been in reducing the impact of HGVs and last mile delivery schemes using low or zero emission vehicles, consolidation centres, utilising digital technology and other interventions[129]. Delivery and Servicing Plans are also part of this and ultimately the logistics industry reacts to its customers who are the generators of the movement of goods. The move toward more innovative and sustainable logistics would be supported where businesses are challenged to be more effective in their supply, procurement and waste policies.

It is recognised that the Opportunity Areas provide excellent potential to shape delivery and servicing activity across the sub-region and through to the wider South East and UK. Strategic assets of Heathrow airport, Old Oak Common, Park Royal, Southall and White City are all recognised here.

Industry is starting to provide innovative intervention options. There is a significant West London opportunity here and one emerging scheme is Magway.

Freight innovation for West London – Magway Input

Rationale and proposal

The Magway parcel delivery service can revolutionise the way goods are transported within and between city areas in safe, fast, reliable and sustainable ways. Magway would support the decongestion of road and rail corridors, reduce transport pollution and road fatalities, as well as support increased business productivity including for SMEs where delivery costs can pose a barrier.

Magway consists of sub 1 metre diameter utility pipes with linear motor and control technology, carrying parcels at a constant speed with limited energy use as a zero carbon proposal.

A pilot proposal has been developed and consulted on, consisting of an 8km route from Willesden Junction to the river at Fulham along existing Network Rail and TfL Overground rail corridors. This route passes West London commercial centres including Old Oak Common and Park Royal, Shepherd's Bush, Kensington Olympia and Earls Court. Once at the river, capacity is provided to logistics centres and development sites along the route.

[129] *Freight Strategy,* WestTrans, Peter Brett Associates (2016)

The Mayor of London has expressed an aim to use the Thames for more transport purposes, where goods could be brought in from the Estuary ports and materials and waste removed from properties within the Magway link catchment.

The Magway strategy is to enable a series of delivery options from the route's urban fulfilment centres including click and collect, e-cargo bikes, drones or EVs, whilst nodes could include key development locations to access users sustainably and conveniently.

Interactions

Digital capacity and innovation is an important interaction, supporting the Magway control system to provide the seamless operation from businesses, warehouses and onto the Magway line and branches to delivery end-points. Potential digital use cases include delivery management with logistic consolidation centres, such as automatic loading. Magway provides a method for those goods to be delivered.

A West London Cycleway and an increase in EV infrastructure would further support sustainable final delivery from Magway.

Further extensions are possible, notably a route North to Watford potentially via Wembley, opening up to more of the UK; a route west to Heathrow and the West of England using the Great Western corridor; and a route east to Paddington.

Magway may also have the potential to transport low-carbon energy through its network, such as through battery storage at nodes, which could support EV charging options. Further, installing the underground pipes for the Magway network could provide an opportunity for fibre installation as well as ground source heat alongside its route development to reduce disruption and provide capacity access to serve major developments.

Estimated cost and funding

The pilot has been costed at £53m for the core Magway system, where the branch network will be paid separately and generate further private sector investment to connect to the main Magway line. Commercial entities would be able to connect to the system at identified nodes to send and receive goods from urban fulfilment centres and this would be funded by developers.

Commercial interest has been expressed for along the route and at the commercial centres, including leisure and shopping points, as well as from developers across logistics, warehousing, commercial land and housing.

Proposed timeline

The pilot system could be operational by 2024 with a development start by the end of 2022. It would be important to consider the development timeline alongside key surrounding developments, including HS2, and in a way to minimise disruption. A ten year pay-back period has been estimated for government and private sector funding through regulated access user charges, and once operational a concession could operate the system.

4.2.4.21. Heathrow surface access improvements

Sustainable surface access improvement proposals include:

- Southern Rail Access – for South West trains via Bedfont, which was led by DfT, Network Rail and TfL and at feasibility stage
- Western Rail Access – for Great Western mainline services, which was led by DfT, Network Rail and industry partners. Network Rail have stated they continue to work with DfT and partners on the rail link at the development and design stage[130].

Enhanced bus service routes and radial cycling routes have also been identified above, where this would support more sustainable travel to the airport, particularly work travel, in advance of these significant infrastructure schemes.

The extent of uncertainty on Heathrow third runway expansion and Heathrow's recovery following Covid-19 (Section 2.3.1) has emphasised the continued importance of surface access improvements. These improvements are supported with and without expansion, firstly in response to the pre-existing situation (prior to Covid-19) of heavily road dependent access to the airport, which

[130] SIDP engagement: Network Rail (October 2020)

brings congestion and poor air quality to the surrounding area. Secondly, Southern Rail access supports the draft West of Hounslow Local Plan in meeting its indicative housing delivery, with dependent development through the proposed Heathrow Gateway and indirect support to Bedfont growth, as identified in its current plan-making and supported by Hounslow[131].

Existing and emerging positions from industry and partners on Heathrow surface access and the development areas' contingency on improvements will be critical. The WLA has a key role here, especially where the case for access improvements continues to exist without expansion and with a recovered air transport sector. Appropriate mitigation schemes need to be developed as more certainty emerges on the political, economic and development environment.

Section 5.2 provides the categorisation of these transport needs, and Section 6 the delivery and funding approach.

[131] West of Borough Local Plan Review, LB Hounslow (2021)

4.3. Energy

The following sub-section sets out the baseline position for energy infrastructure in West London, considering the policy priorities, challenges and committed projects, before assessment of the strategic needs and options.

As for other utilities, the energy infrastructure environment is especially dynamic at present, particularly as a real strategic shift towards carbon reduction and the use of renewable energy sources have become core to national and sub-national policy direction. Consequently, many uncertainties remain in terms of how future energy infrastructure supply can best be planned, funded and delivered. However, without a doubt, local authorities will need to work together in a strongly collaborative way to define and meet sustainable energy infrastructure needs in the decades to come.

4.3.1. Strategic policy priorities

The UK Government has committed to a 2050 Net Zero target. This is now complemented by the ambitious target to reach 78% emissions reduction by 2035 (compared to 1990 levels) with the UK's 2033-37 (6th) Carbon Budget, which will include the UK's contribution to international aviation and shipping emissions.

The decarbonisation of transport and heating, alongside low and net zero carbon generation, and improvement in the energy efficiency of homes and buildings are critical to meet this.

The Energy White Paper (2020) clarified a strategy for the wider energy system that is transformative as a 'Green Industrial Revolution' to meet the Government's Ten Point Plan for:

- Green public transport, cycling and walking;
- Building Hydrogen capacity with heating trials;
- Nuclear power provision of low-carbon electricity;
- Offshore wind capacity expansion;
- Zero-emission aircraft and green ships;
- Green buildings and move away from fossil fuel appliances;
- Carbon capture, usage and storage (CCUS);
- Protecting the natural environment;
- Zero emission vehicles, to end sale of petrol and diesel cars by 2030; and
- Green finance and innovation, with the UK Research and Development Roadmap.

4.3.1.1. Energy - London

The Mayor's overarching energy objective for 2050 is to ensure London's energy infrastructure is developed in a way that delivers:

- Security and reliability of supply;
- Affordability and cost-competitiveness of energy;
- An 80% carbon dioxide emissions reduction by 2050 in line with Mayoral and national government policy[132].

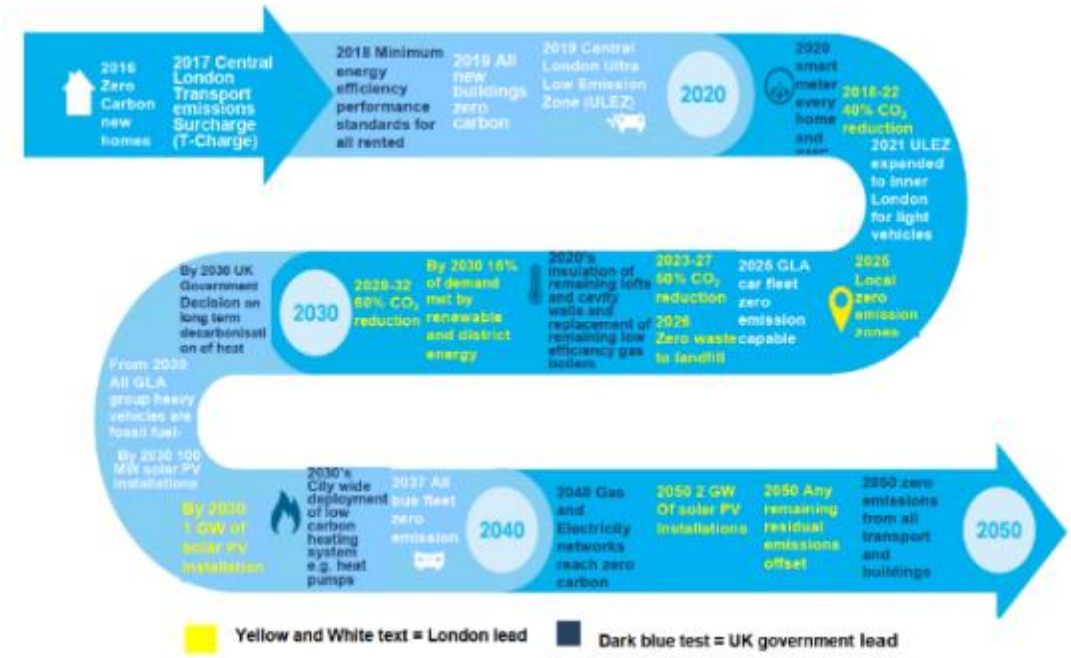
The Mayor's London Environment Strategy (2018) aims for London to be a zero carbon city by 2050, this is underpinned by three high-level objectives:

- Decarbonise London's homes and workplaces while protecting the most vulnerable by tackling fuel poverty;
- Develop clean and smart, integrated energy systems using local and renewable energy resources; and
- Deliver a zero-emission transport network by 2050.

[132] *Energy Infrastructure webpage*, GLA. Accessed at: https://www.london.gov.uk/what-we-do/business-and-economy/better-infrastructure/energy-infrastructure-0

The Mayor has also called on the regulators to join up their planning and procedures with mechanisms for co-ordination within London, recognising the need for greater co-ordination at the national level. Joined up planning across regulators, and therefore utility providers, will be a valuable step towards improved delivery of infrastructure in London[133].

Figure 4-6 The Mayor of London's Environmental Strategy (2018) to 2050 Net Zero



London's energy network will need to move from the carbon intensive national grid to local, low carbon heat and power networks, to a share of 50%. Energy generated locally from a diverse range of sources, including gas and waste heat, will significantly reduce emissions and provide resilience.

To move towards 50% local production, actions have been identified as[134]:

- Local energy projects developed from small to large scale projects capable of providing significant amounts of energy to London;
- Fairer access to the electricity supply market for local providers; and
- Detailed energy infrastructure planning across London, mapping opportunities for local production.

New development requirements

Developments in London are expected to achieve at least a 35% onsite reduction in emissions above the previous national standards (the 2013 Building Regulations)[135]. The approach that developers are expected to follow – the energy hierarchy – is set out in the London Plan. This expects development proposals to minimise carbon dioxide emissions from the construction and future operation of buildings, as well as its annual and peak energy demand, to:

- *be lean:* use less energy and manage demand during construction and operation
- *be clean*: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly
- *be green:* generate, store and use renewable energy onsite

Where the target cannot be met onsite, developers are able to offset emissions through carbon reduction measures offsite, in agreement with the borough, or make payments to offset the shortfall.

[133] '*Enabling infrastructure: Green, Energy, Water and Waste to 2050',* Mayor of London (2018)
[134] '*Enabling Infrastructure: Green, Energy, Water & Waste Infrastructure to 2050,* Mayor of London (2015)
[135] The London Environment Plan (2018) and London Plan

In addition, the London Plan Policy SI 2 sets out the *'be seen'* requirement for all major development proposals to monitor and report on their actual operational energy performance. The *'be seen'* policy will help to identify ways to improve performance and ensure compliance with the net zero target.

Developers are expected to prioritise local energy sources, where available, and ensuring air quality is a key consideration. Developers should investigate the generation and storage of renewable energy onsite[136]. Energy masterplans should be developed for large-scale developments to identify:

- Heat supply and demand from key sites and existing buildings;
- Opportunities for heat networks, using energy from waste, secondary sources, and for renewable generation use and energy efficiency;
- Infrastructure and land requirements for electricity and gas supplies.

Development plans should:

- Identify the requirement and sites for energy infrastructure including energy centres, storage and upgrades;
- Identify heating and cooling networks as well as locations for future networks and expansions.

Developments within Heat Network Priority Areas should have communal low-temperature heating systems which utilise one of the following heat sources, as a hierarchy: existing or planned networks; zero emission or secondary sources; low emission Combined Heat and Power (CHP) networks, where there is a case for CHP to deliver an area wide network to meet the development demand and demand response to the local electricity network; or ultra-low NOx gas boilers. Developments should connect to existing heat networks wherever feasible.

4.3.1.2. Energy - West London

A 2018 report sets out the ambition for West London to transition to a Green City, this was led by the West London Sustainability and Climate Change Policy Commission[137]. The vision presented has four strategies:

- Reducing carbon emissions from electricity to zero by 2032 and heat by 2050, by reducing energy consumption and increasing the use of renewable distributed energy;
- The roll out of smart city technologies to drive more efficient consumption and quality of life;
- The adoption of circular economy principles by West London business; and
- A cleantech cluster in West London supporting low carbon growth.

On the first strategy, a series of recommendations were made:

- Establishment of zero emission networks and working with West London business for action plans to improve air quality focus areas;
- Through a West London Energy Users Group, jointly procure zero carbon energy/ electricity supply through centralised and distributed supply and storage;
- Analyse West London's electricity capacity and demand (current and future) and plan to deliver zero carbon electricity by 2032, this includes excess heat sharing; and
- Through a West London Energy Users Group, support energy efficiency transformations to ensure minimum EPC ratings are met and businesses implement ESOS efficiency recommendations.

4.3.1.3. Local aspirations

Each of the seven boroughs within West London identify specific energy visions and objectives for future development in their Local Plans. It is evident from the available documentation and information gathered that the primary aspirations for all of the boroughs are to promote energy efficiency through sustainable design and construction, prioritise low carbon heat networks through feasibility assessments and work with partners and providers to unlock investment to ensure energy infrastructure is upgraded and newly installed to meet future demand and capacity requirements.

[136] *London Plan, Policy SI_3* (Dec 2019)

[137] *Green City in the West: Leading the transition:* West London Sustainability and Climate Change Policy Commission, for West London Business (2018)

Major developments are also required to demonstrate that their heating and/or cooling systems have been selected to minimise CO2 emissions and are future-proofed.

Boroughs have also declared climate emergency with strategies and action plans being released and developed[138].

4.3.2. Current provision and challenges

Electricity provision consists of National Grid for the transmission network and overall system operation, Distribution Network Operators (DNOs) for the distribution networks and Licensed Electricity Suppliers (LES) for the sale to end users. In West London, the electricity DNOs are UK Power Networks (UKPN) and Scottish & Southern Energy Power Distribution (SSE). The DNOs agree investment plans with Ofgem through the regulated business plan process and Ofgem's main interest is protecting against unnecessary price rises.

In general, there is no investment 'ahead of need' due to the uncertainty of supply requirements and risk of excess costs (than what can be recovered through customer bills). Rather, requests made outside of regulated plans for development capacity are covered by the requestees, resulting in sunk costs for first movers that can constrain viability and delay developments. The developing London Energy Plan recognises these challenges and is proposing solutions such as the bearing of risk by developers for unused provision or excess cost, with potential contribution from boroughs.

For gas, the DNOs in the boroughs are Cadent Gas and Southern Gas Networks, alongside smaller networks for licensed operators. National Grid operates the National Transmission System (NTS) which transports gas from terminals to Local Distribution Zones (LDZ), including London. Connections are assessed on a first come first basis and not ahead of need, so that capacity available today may not be available tomorrow, which impacts development certainty.

Overall, electricity demand is expected to increase in London in response to population growth and through the increased demand from electric vehicles and electric heating systems. The electricity network is at capacity in some areas of London and this will need to be addressed according to the rate and locale of projected population growth, such as for the Opportunity Areas, with substations and wiring infrastructure requirements expected.[139]

Current infrastructure and consumption

Several of these substations are currently at maximum capacity and a lack of energy storage in the boroughs and this means that grid balancing and a reduction in peak demand is not possible leading to power outages in some key areas.

Studies have estimated infrastructure pressures and requirements, including an estimate that the current system is constraining over £200m in electricity infrastructure investment that would unlock new development areas, with GLA estimating a need for 8 to 9 new substations for London[140].

Demand for natural gas in London has been decreasing, with a 25% reduction since 2000[141] and this is expected to continue due to improved efficiency, decarbonisation of the electricity grid and availability of low carbon decentralised energy alternatives. The London Plan identifies that local infrastructure improvements may be required to supply energy centres as part of heat networks, that will support growth in Opportunity Areas, and there may also be a requirement for the provision of new pressure reduction stations. These requirements should be identified in energy masterplans, which should be driven with early engagement between boroughs, developers and energy companies.

In terms of West London energy consumption, the latest BEIS energy data provides the following breakdown of consumption.

Table 4-5 - Borough energy consumption GWh, 2019

Borough	Electricity	Gas

[138] LB Hounslow *Climate Emergency Action Plan* (January 2020), LB Harrow *Climate Change Strategy* 2019-24 (January 2019), LB Ealing *Draft Climate and Ecological Emergency Strategy* (September 2020) set for publication in December 2020.

[139] '*Enabling Infrastructure: Green, Energy, Water & Waste Infrastructure to 2050,* Mayor of London (2015)

[140] '*London Electricity Infrastructure Review. Technical Working Group Report'* Ramboll for the GLA (2014).

[141] *London Energy and Greenhouse Gas Emissions Inventory (LEGGI)*, GLA

GW consumption	Domestic	Non-domestic	Domestic	Non-domestic
Barnet	611.7	486.1	2,240.0	532.3
Brent	415.7	765.9	1,580.4	589.6
Ealing	465.3	893.1	1,723.0	681.9
Hammersmith and Fulham	280.8	667.6	904.2	552.5
Harrow	343.1	206.3	1,467.0	231.1
Hillingdon	420.3	945.4	1,494.0	668.3
Hounslow	377.2	879.7	1,214.8	561.8

Source: BEIS Local Authority Electricity and Gas Consumption, 2019 latest data (Feb 2021 release)

This shows Barnet with the highest domestic electricity and gas consumption, this is driven by it being the largest borough by population. The boroughs of Brent, Ealing, Hillingdon and Hounslow have the most significant industrial consumptions, where there is higher consumption for electricity than gas across the boroughs other than Barnet and Harrow. Hillingdon is the biggest consumer of electricity and gas combined for industrial uses with the presence of Heathrow and surrounding industry.

In comparison to 2014 data for the seven boroughs, demonstrating the 5-year change, there is an average 3% decline in housing electricity consumption, consistent across the boroughs, and an overall 6% decline in West London's industry electricity consumption though this varies across the boroughs. In gas consumption, a comparison to the 2014 data shows a domestic consumption reduction of 3% and industry at 17% across West London.

This fall in consumption is in part driven by energy efficiency improvements, where regulations and initiatives for boilers, lighting, loft insulation and retrofitting have been effective, alongside the Energy Act in requiring new residential and commercial properties to meet the new minimum 'E' EPC. This reduction in consumption is expected to accelerate within London as the energy policies and targets become more stringent. For example, boroughs are undertaking retrofit programmes to ensure domestic and non-domestic buildings are retrofitted to an average EPC rating 'B' to 2030, whilst boroughs support the use of BREEAM (Building Research Establishment Environmental Assessment Method) to measure the environmental performance of non-residential buildings and there are expectations for development to meet an excellent rating.

The COVID-19 impact and future resilience

The repercussions of the COVID-19 pandemic have led to a consideration for how the demand for energy and utilities will vary going forward. The future of work and leisure time as a driver of economic change may be accelerated as home and flexible working and home-based service consumption is further tested and becomes embedded as new habits.

A report by IEA (2021)[142], found total electricity levels dropped to 'Sunday levels' during the week during lockdown and recovered as lockdown restrictions eased. For June and July 2020, the demand remained 10% below the 2019 levels (weather corrected). By November and December 2020, demand moved 5% above the 2019 levels, reflecting some surge with further easing and built-up demand.

The resilience of the energy network for housing areas will be important going forward, and need to be considered for the Opportunity Areas of high housing growth where the housing-commercial space mix may change and any such mix may not reflect previous differentials in energy need.

This also concerns water and digital provision (covered in relevant sections).

Energy decarbonisation challenge

Energy provision is instrumental to London's decarbonisation target, whereby electricity accounts for nearly half of the city's CO2 emissions. GLA analysis[143] of GHG emissions shows that 36% of

[142] *Covid-19 Impact on Electricity – Statistics Report,* International Energy Agency (2021)
[143] *London Environment Strategy*, GLA (2018)

emissions come from homes, where heating and water are the significant drivers, 40% from workplaces and 24% from transport.

In terms of West London's current emissions, BEIS provides the latest sub-national CO2 emissions data, as presented below.

Table 4-6 - Borough CO_2 emissions (kt), 2018

Borough emissions (kt)	Industrial and commercial			Domestic			Transport	Total
	Elec.	Gas	Total, incl. other	Elec.	Gas	Total, incl other	All	All
Barnet	117	109	243	143	417	564	397	1,204
Brent	182	111	321	98	292	393	205	918
Ealing	215	54	314	137	149	299	510	1,120
Hammersmith & Fulham	162	109	283	67	169	237	151	670
Harrow	51	47	106	80	272	355	125	584
Hillingdon	754	303	1,113	245	322	572	654	2,336
Hounslow	217	110	343	89	225	318	341	1,000
West London	**1,698**	**843**	**2,723**	**858**	**1,845**	**2,738**	**2,384**	**7,832**
London	5,936	3,900	10,388	2,952	7,711	10,780	7,737	28,852

Source: BEIS, UK Local Authority and regional carbon dioxide emissions 2005-18 (June 2020), latest data

This shows that the seven boroughs of West London contribute 27% of both the domestic and industry emissions in London, which is disproportionate as West London has 23% of the London population and 18% of jobs (Section 3). Once transport is included, the emissions increase with the role of Heathrow and the strategic road network, with West London representing 31% of London's total CO_2 emissions in 2018.

Retrofitting existing buildings and the application of standards in new build developments is important alongside energy demand reductions and the provision of low carbon and decentralised sources to enable carbon reduction targets to be achieved. Modelling shows that the decarbonisation of energy grids is critical, beyond transport emissions, for London to reach net zero. Carbon capture and storage will also be part of the solution for the remaining emissions that cannot be directly reduced[144].

Zero carbon buildings standards, set out in the London Plan, mean newly built homes or workplaces will require less energy, and such standards will continue to be tightened to meet higher efficiency and renewable energy use. Developers may offset carbon elsewhere offsite where higher building standards may not be met or make payments based on a borough's 'carbon offset price'.

A key challenge alongside the decarbonisation of the energy network is the impact of transport decarbonisation. The successful move to EVs with the ban on petrol and diesel vehicles will require the National Grid to support the estimated demand increase through green energy. Further, the local energy distribution network will need to be able to accommodate the additional loads, where extensive upgrade will likely be required.

An important London aim is to enable investment ahead of need in electricity infrastructure. This requires overcoming the financial and uncertainty barriers, which impact the cost and delivery of developments. Solutions are being worked on through the Energy Plan to 2050 that is being developed following the London Infrastructure Plan 2050.

[144] *The London Zero Carbon Pathways Tool.* Accessed at: *https://maps.london.gov.uk/zerocarbon*

4.3.3. Planned and proposed strategic infrastructure

4.3.3.1. London wide

The Energy Plan to 2050 will map London's energy supply and demand and required supporting infrastructure. This includes heat and electricity infrastructure, the retrofitting of the built environment, and electrically powered transport. The plan will also consider 'smart' energy potential with demand shifting, smart metering and storage options to optimise energy supply and use, especially where this is intermittent.

These transformations will be critical to support London's sustainable population and economic growth, and will be directed by the national government decisions, where by 2030, the UK government will confirm its long-term approach for gas to inform the full decarbonisation of London's heating systems by 2050.

By 2040 the majority of public transport will be zero emission and by 2050 the vast majority of London's building stock will need to have been retrofitted with measures to deliver high levels of energy efficiency. Remaining demand will be met by clean energy systems, dominated by the supply of renewable electricity and gas to London's buildings and vehicles[145].

National level guidance and actions are critical to this timeline, such as standards for energy efficiency, large-scale building retrofitting and the decarbonisation of heat. This timeline is supported by London projects including:

- RE:NEW and Energy Leap for home energy efficiency and retrofitting, RE:FIT programmes for buildings to reduce their energy, and the commercial boiler scrappage scheme. Since 2009, programmes such as RE:NEW, Better Boilers and the London Boiler Cashback Scheme have treated over 139,000 homes[146].
- The operation of a London Energy Supply Company to ensure fair tariffs
- Supporting local heat networks (Decentralised Energy Enabling Project), and the buying of local low carbon electricity through Licence Lite
- Supporting local community solar projects (London community energy fund) and bulk buying cheap solar panels (Solar Together London)

Decentralised energy generation

In supporting the London objective for local and efficient energy generation, the Decentralised Energy Project Delivery Unit (DEPDU) has been set up to support London boroughs and partners to develop decentralised projects. The London Environment Strategy (2018) and London Plan also set out proposals for delivering more decentralised energy with:

- Large scale decentralised and low carbon projects - increasing the supply from district heating to 15% of supply by 2030 and using the London Heat Map to identify suitable sites with boroughs to develop masterplans.
- Increase the amount of solar generation, supporting local community projects to meet the 1MW and 2MW targets for 2030 and 2050 respectively. As part of this the Mayor has launched 'Solar Together London', a collective purchasing pilot scheme to reduce costs for Londoners and to encourage solar energy installations with new development where feasible.
- The Mayor will work with national government to identify research opportunities to pilot zero carbon hydrogen heat projects working with the London Hydrogen Partnership.
- Work with transmission and distribution network operators to mitigate the potential impact of EV charging and electrification of heat
- Mapping of London's flexible energy capacity as a first phase of a FlexLondon project on demand responses

This is supported by 'Licence Lite', which enables smaller, local electricity suppliers sell power to the market without the significant licencing requirements and costs that larger suppliers have to meet.

[145] *London Environment Strategy*, GLA (2018)
[146] *London Environment Strategy,* GLA (2018)

4.3.3.2. Committed project developments

Energy infrastructure projects that are committed and/ or in progress are set out below, from document review and engagement.

Electricity

- **Wood Lane Electricity substation -** Delivery for 2020-1, at a £1m cost and supporting White City.
- **New substation to support facilities and Deep Tube Upgrade Programme at South Harrow.** For 2020 delivery, at £1m
- **Plant and Generator Work at Prologis Park** for 2020 delivery, at £2m supporting West Drayton and Hayes
- **A 2nd Primary Substation for Brent Cross development** to be delivered to the North East of Brent Cross for 2021-25, through Brent Cross developers and service providers[147].
- **Brent Cross/ Cricklewood Installation of electricity networks** in place for 2026, funded and delivered by developer and service providers.
- **Hayes development** diversion/alteration of electricity distribution for new development, for 2020-25 and at £10m with a £4m primary substation need funded by developer and service providers.
- **OOC/ Park Royal** - UKPN are developing a new substation to meet the level of demand in the OOC/Park Royal area. The new site located in Park Royal will supply additional capacity to meet the increase in demand. The site is anticipated to be commissioned in 2021.
- The OPDC IDP (2021) also includes requirements as the maintenance, renewal and replacement of electricity and gas supply infrastructure for across the area, with substations provision where the quantity and location requirements need to be determined, and the upgrade of power supply at Atlas Road substation[148]. These are assumed to be provided by the DNOs and initiated and funded by developers, as considered for the other Opportunity Areas.

Gas

- **North London Large Diameter Gas Mains Replacement** with delivery for 2021, at a £50m, led by Cadent Gas. Supports Earls Court and West Kensington and wider growth.
- **Partingdale Lane - Gas Peak Power Facility -** A 49.9mw provision of electricity at Millbrook Park for the National grid substation, to be delivered 2020-22 at an £18m cost. This will support Barnet growth areas in particular[149].
- **Relocation of gas governor to south of Brent Cross shopping centre** to be delivered 2021-25 by the Brent Cross developers and service providers[150].
- **Increased capacity of Pressure Reduction Station (PRS) at Birchen Grove** to be delivered for 2021 at a £5m cost, supporting Brent growth areas.

Decentralised energy, heat and district networks

- **Copley Close Energy Centre** to deliver heating and hot water to 500+ homes and with potential future connections, at a cost of £25m and for delivery 2021-23, supporting Ealing growth.
- **Hayes provision of a combined heat and power plant with a district heating network** where excess capacity can be piped to other sites and catalyse a wider district heating network. Developer committed at the former Nestle site.

[147] *Infrastructure Delivery Plan,* LB Barnet (2011)
[148] *Infrastructure Delivery Plan*, Old Oak and Park Royal Development Corporation (2018); and UKPN SIDP input.
[149] *London Infrastructure Mapping Application* - https://maps.london.gov.uk/ima/
[150] *Infrastructure Delivery Plan,* LB Barnet (2011)

- **Brent Cross/ Cricklewood Installation of networks for district heating and CHP/ Combined Cooling, Heat & Power** in place for 2026, funded and delivered by developer and service providers.

Energy efficiency and retro-fitting

Schemes have been established by central government (BEIS) in the 10 point plan and will assist with decarbonising heat in London on a domestic and corporate scale. Current work includes:

- **Hounslow energy efficiency schemes** with a rolling EPC programme to 2024 to reduce energy demand, assumed to be funded by CIL.
- The Public Sector Decarbonisation Fund has also been used by boroughs for retrofitting school buildings with heat pumps, solar PV, led lighting, battery storage and optimisers. [151]
- The Green Homes Grant Voucher Scheme has been used to support the decarbonising of heat as part of a RE:Fit programme.
- A consortium of seven boroughs, including Brent, Ealing, Hammersmith and Fulham, Harrow and Hounslow, are using the Green Homes Grant: Local Authority Delivery (LAD) scheme including £4.878m funding to retrofit social and private housing stock as well as grants to lower income households. This improves energy ratings of the properties with measures including insulation, low carbon heat systems (such as air source heat pumps), energy efficient doors and windows, heating controls and hot water tank insulation. This helps address fuel poverty whilst supporting Boroughs to meet Net Zero targets.
- The Brent Climate Change Action Plan, sets out a retrofitting agenda to assess the energy efficiency measures most effective for the existing housing stock and through the delivery of the New Council Home Programme will aim to achieve an average rating of Energy Performance Certificate (EPC) B in directly owned council stock by 2030.
- Hounslow is pursuing the installation of energy saving measures (solar PV, heat pumps, LED lighting, optimisers, battery storage) in schools and corporate buildings (offices, libraries, leisure centres, depots). This has been suggested at a cost of £20million for 33 schools and 30 corporate buildings across Hounslow including the Great West Corridor and West of Borough. This will look to funding from the Green Recovery Plan.

Energy providers – SIDP Input

The key plans identified above, along with the Opportunity Areas, are known by **National Grid**. They have confirmed that there would be no requirement for upgrades to the National Grid infrastructure and did not identify issues regarding the capacity of gas and electricity infrastructure in relation to the level of proposed growth and its spatial distribution. Any connections to the network are the responsibility of the local distribution company[152].

In response to the SIDP, **SSE** have stated that their aspiration is to react and serve the planned and future developments of developers and authorities in this area. SSE aim to provide low carbon heat networks and distributed energy technology. Their role is to respond to energy strategies and deliver them in the most efficient way possible[153].

In response the SIDP, **UKPN** highlighted that they are developing a new site to meet levels of demand in West London. The new site is located in Park Royal and will supply additional capacity to meet the increase in demand in the area. The site is anticipated to be commissioned in 2021.

UKPN also stated that due to the way they are funded there is no requirement for electrical demand to be met at the point of planning application. For new customers to receive a supply they would need to apply to either UK Power Networks, an Independent Distribution Network Operator or an Independent Connections Provider. At this point their requirements would be assessed and a quotation for a connection provided. [154]

[151] *Draft Infrastructure Delivery Plan,* LB Hounslow (2020). SIDP Input, LB Hounslow (March 2021)
[152] SIDP engagement: National Grid (September 2020)
[153] SIDP engagement: SSE response (September 2020)
[154] SIDP engagement: UKPN (November 2020)

The local plans of the boroughs have identified the potential requirement for new and/or upgraded primary and distribution substations and the appropriate DNOs have been contacted for a status update.

Cadent (formally National Grid Gas) indicated that the existing infrastructure around development in Hammersmith Town Centre might have sufficient capacity to supply anticipated development however, local reinforcement and remedial works may be required to support for part of forthcoming development[155].

The strategic priorities and identified challenges for West London's energy provision have informed the identified strategic energy needs in Section **Error! Reference source not found.**. These are in a dvance of the planned infrastructure highlighted in this section, whilst there are some important sectoral interactions and effective approaches that inform the identified needs.

4.3.4. Strategic need and opportunity

4.3.4.1. Decarbonisation and decentralised energy

Beyond the decarbonisation of the grid, energy efficiency improvements and zero carbon new development, more transformative projects and infrastructure will be required to ensure the meeting of zero-carbon targets. This includes the adoption of new technologies to deliver low carbon heating, utilising energy from waste, energy from water, ground and air through heat pumps, the capture of heat from buildings and infrastructure and heat networks in dense areas to distribute between buildings. Smart technology is also needed within the energy system to balance supply and store off-peak generation, such as electricity batteries and hot water cylinders.

As set out in the London Plan, development will require energy supply infrastructure including energy centres to capture and store energy as well as generate it – and this in turn has land and investment requirements, both of which present potential risks to development. The ability to efficiently generate and store energy can reduce overall energy consumption, reduce peak demand through balancing and integrate greater levels of renewable energy into the system[156].

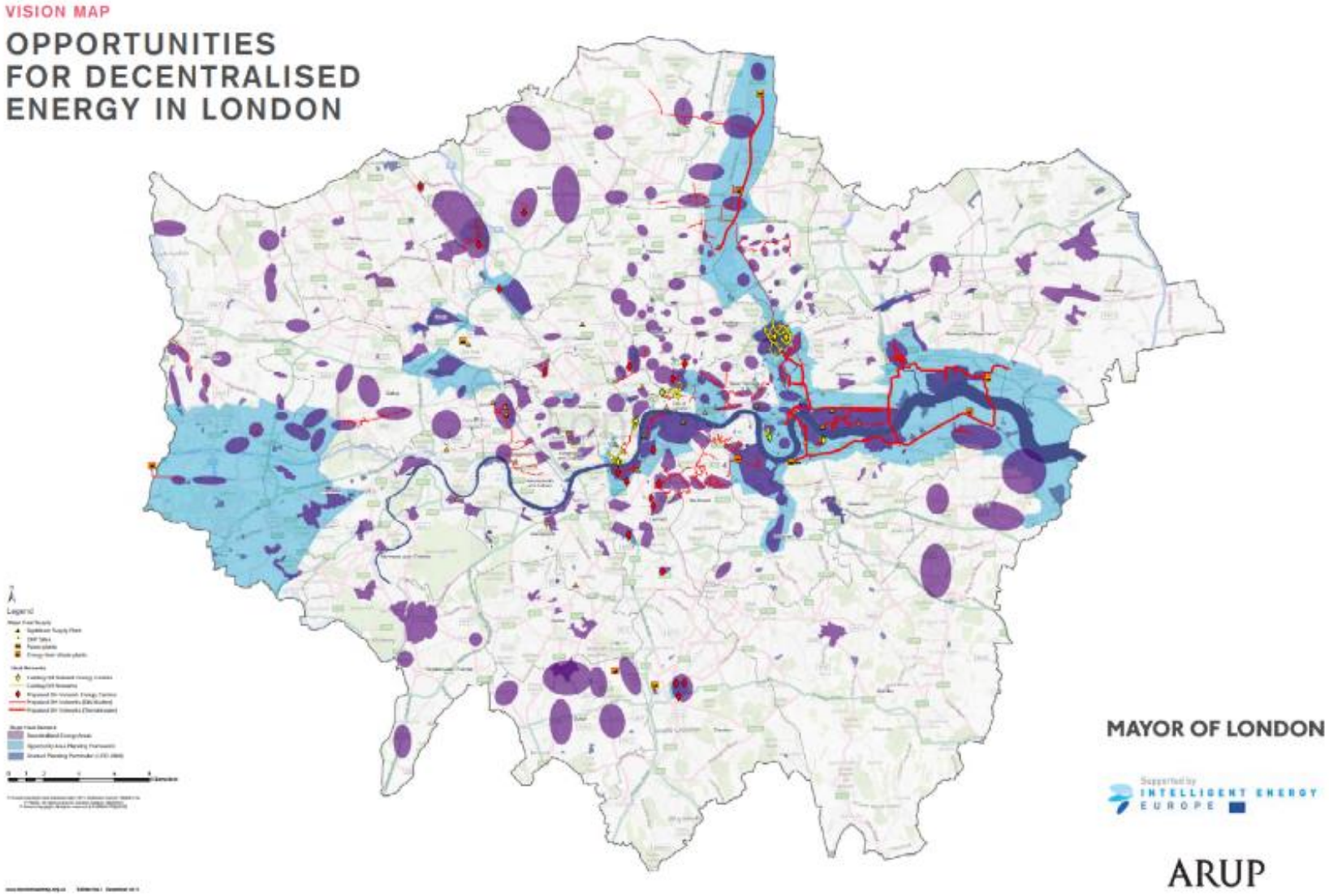
Many of London's existing heat networks have grown around combined heat and power (CHP) systems. However, the carbon savings from gas engine CHP are now declining with the national grid electricity decarbonisation. Heat networks are still an effective and low-carbon supply of heat in London and offer opportunities to transition to zero-carbon heat sources. The London Plan states that where there remains a strategic case for low-emission CHP systems to support area-wide heat networks, these will continue to be considered on a case-by-case basis, whilst existing networks will need to establish decarbonisation plans. As such, wherever feasible developments should connect to existing heat networks or utilise secondary and zero emission sources.

Heat Network Priority Areas for London have been identified, as presented on the London Heat Map[157]. These identify where heat density is sufficient for heat networks and can effectively supply heat to buildings and consumers. Developments within the Heat Network Priority Areas that are beyond existing heat networks should facilitate cost effective connections. Major development outside these Heat Network Priority Areas should use low-carbon heating systems to meet the development's demand, whilst considering the management of peak demand.

The figure below shows opportunities for decentralised energy in London based on the London Heat Map energy assessments[158].

[155] Draft Hammersmith Town Centre DIF, reference provided by LB Hammersmith and Fulham (April 2021)
[156] *London Plan,* GLA (Dec 2019)
[157] London Heat Map. Accessed at: https://www.london.gov.uk/what-we-do/environment/energy/london-heat-map
[158] *London Heat Map - Opportunities for Decentralised Energy in London - Vision Map*

Figure 4-7 Decentralised energy opportunities London



As demonstrated by this map and as identified with borough documentation, there are strategic growth locations within these decentralised energy areas including the Opportunity Areas: Brent Cross/ Cricklewood, Colindale/ Burnt Oak, Wembley, OOC/ Park Royal, White City, Southall, Hayes and Great West Corridor. Further:

- Much of Barnet is within a Heat Network Priority Area with developers to undertake feasibility assessments to identify opportunities for network connections.
- Brent's Local Plan states that development within Northwick Park and Staples Corner, Wembley and South Kilburn should connect to or contribute towards a decentralised energy system unless it is not feasible or if the proposed heating system is 100% renewable.
- Hammersmith and Fulham's Local Plan requires major developments to demonstrate low carbon heating and cooling systems, including the need to assess connection feasibility to an existing decentralised energy system or to integrate CHP or communal heating systems. In addition, on site-renewable energy generation should be considered.
- Harrow has set out a long-term sustainability vision with investment in decentralised energy generation.
- The London Heat Map has identified three hot-spots in Hillingdon that provide opportunities for low carbon heat and power networks, as Uxbridge, Hayes and Heathrow.
- The Hounslow Local Plan expects all major developments to connect to or extend existing decentralised energy networks in the site vicinity where feasible.

In meeting the London and West London targets for zero carbon energy provision, strategic developments will also need to increase their use of renewable and secondary zero emission energy, including production on-site such as solar PVs, heat pumps, solar thermal and wind and hydropower where feasible. To reduce the energy supply pressures, new developments should also provide energy efficiency measures and sustainable water catchment and drainage technologies where possible.

4.3.4.2. Future energy scenarios

Every year, the National Grid publishes Future Energy Scenarios (FES). These FES' have the aim of providing credible pathways of energy futures for the UK over the next 30 years to enable more effective strategic planning. The 2020 scenarios are identified below:

- Consumer Transformation
- System Transformation
- Leading the Way
- Steady Progression

Figure 4-8 FES 2020 Scenarios

All of the scenarios have net zero at their core and explore different pathways to achieve this. In the scenario framework, Consumer Transformation and System Transformation both hit net zero by the 2050 target. Leading the Way achieves net zero slightly before this in 2048 and Steady progression still emits 258 MtCO2e in 2050 (which equates to a reduction of 68% compares to the level in 1990).

The 2020 FES scenarios show that the adoption of low carbon technologies in parallel with significant consumer behaviour and lifestyle changes are required to achieve net zero by 2050.

This should be considered in West London, whereby technology adoption alone will not be sufficient to meet the London Plan aspirations, instead knowledge sharing, and consumer incentives will be critical to ensure targets are achieved.

4.3.4.3. Opportunity Areas

The emerging programmes for the Opportunity Areas consider new combined heat and power system (CHP) criteria, on-site electricity and heat production from solar and thermal heat, communal heating systems that use heat or zero emissions, as well as ultra-low gas boilers.

The delivery of district energy programmes planned in West London and in the strategic growth areas should be prioritised and accelerated where feasible, where these can be extended to other new developments, including business and industrial areas. This will support the reduction in domestic and commercial energy consumption and in turn the associated carbon emissions.

Opportunity Areas have undertaken or will undertake Studies to utilise their designation as Decentralised Energy and Heat Network Priority Areas. These have been taken forward at various levels:

- White City has proposed energy centres including land North of Westfield, as a centralised energy centre providing heating and cooling to the whole development including CHP engines

and use of gas fired CCHP[159]. The energy centre would be suitable for connection to other energy centres to serve the White City Opportunity Area, with ability to connect the energy centre to a wider network and potentially export heat from the CHP generators.

- White City provision of an efficient decentralised CHP energy centre at the M&S Site[160]. The centre is future proofed for connection to the proposed DHN, including designing compatible heating and cooling systems for future connectivity and expansion. Connections to combined heat and power (CHP) or decentralised energy network, with future extensions, are enabled.
- Earls Court and West Kensington decentralised energy network[161], which will be reconsidered with the expected new masterplan following site ownership change. King's Road Park does have dedicated space allocated for a district heating pipe work connection and to distribute heat around the scheme in the pipework structure set for the Community Heating Network. Phase 2 will deliver a permanent Energy Centre estimated for completion in 2025[162].
- The Brent Local Plan states that the Council will require establishment of district heating networks within the new Neasden Stations, Northwick Park and Staples Corner Growth Areas. All other Growth Areas will be expected to develop district heat networks; however, the scale and type of network will vary depending on the location and scope.
- Colindale and Burnt Oak developments are expected to provide combined heat and power, similar to the commitments at Brent Cross/ Cricklewood.
- A Southall Decentralised Energy Network feasibility and Business Case (2015) was undertaken to determine the case for a district heating network, with a large energy centre housing boilers and gas engines producing combined heat and power. However, this has yet to be taken forward and it has stalled with the lack of a clear finance and funding case. An early estimate for the work was £7-10m.
- A subsequent Southall District Heating Network Route Feasibility Study (2017) followed, where this has not yet been progressed but included the installation of a pipe route to the Southall East development, at an estimated cost of £1.5-2.5m.
- There have been considerations of a Wealdstone Town Centre district energy network. A Harrow and Wealdstone Decentralised Energy Network feasibility and Business Case was previously undertaken to determine the case for a district heating network, with a large energy centre housing boilers and gas engines producing combined heat and power. However, this has yet to be taken forward and has stalled with the lack of a clear finance and funding case.

Within the Opportunity Areas, it is understood that upgrades to the existing electricity and gas supply networks may also be needed to address existing limitations and meet future needs.

Where decentralised energy networks and heat networks are prioritised across the Opportunity Areas, these locations will need to be considered as a priority in infrastructure delivery to ensure resilient and efficient supply which minimises heat losses and therefore energy consumption.

The below sets out some of the emerging approaches for the Opportunity Areas.

OOC/ Park Royal

The OPDC IDP[163] sets out a series of energy infrastructure requirements across decentralised energy and electricity and gas provision. Decentralised energy delivery was identified to be dependent on land ownership and the delivery model but would be phased with development at Old Oak North and Scrubs Lane, supported with energy centres. A strategic area-wide district network is proposed, with phasing in line with development and noting that buildings can operate on temporary gas boilers as required. For North Acton, an area wide network is proposed with developers to provide on-site heating solutions and connect to a strategic network at a future date. For Old Oak North, a district heat network using heat extraction from the sewer network has been proposed.

Hayes

[159] Sustainability Statement submitted by applicant (2016)
[160] Sustainability Statement submitted by applicant (2014)
[161] *Infrastructure Delivery Plan,* Hammersmith and Fulham (2016)
[162] *Kings Road Park planning application energy statement* (2018)
[163] *Infrastructure Delivery Plan,* Old Oak and Park Royal Development Corporation (2021)

Within the Hayes Infrastructure Funding Study[164], the developers of the large former Nestle site have committed to providing a site-wide heating network from CHP with suitable connection to wider district networks in the future. In addition, the Old Vinyl Factory site has some spare capacity that could connect to nearby site.

It is unclear at this stage who the energy partners for the new infrastructure will be. In addition, the Vinyl Factory site development site states the provision of 350 units, as such energy assessments need to be undertaken to ensure the spare capacity is capable of supplying the new development. If it is not, it will need to be considered whether the Heat Network can supply the whole site. A new energy centre is also planned for the development. Appropriate site selection should be prioritised to ensure pipework and connection routes are minimised where possible to reduce distribution losses and efficiency reductions across the network.

White City

The development is expected to make provision for connections to combined heat and power (CHP) and decentralised energy network, beyond the decentralised CHP energy centre at the M&S Site that has been delivered to date Further, PVs and building insulation is planned (i.e for the former BBC site) alongside energy efficiency measures including smart metering and heat recovery.

Proposals to construct a heat pipe plant and networks to help meet the carbon reduction targets are being assessed by the GLA[165]. However, network coverage needs to be considered. Where a DHN is served by a single energy centre, the extent of the network typically reaches a 3km radius due to pipework heat losses and operational temperatures. If the regeneration area spans wider than this radius, additional energy centres will be required to maintain the correct operational temperatures and efficiencies. It is therefore crucial that the proximity of strategic energy centre sites to the connector consumers is considered in the evaluation of the opportunities for the CHP/ decentralised energy network.

Southall

The District Heating Network Route Feasibility Study identified two feasible routes for the network; however, both come with their own challenges. Route 1 is highly congested with existing utilities and as such extensive surveys will be required to ensure no utilities diversions are required resulting in a cost of £4m. On the other hand, Route 2 is both more cost effective at an estimated £3m and less risky with regards to clashes with underground services however coordination with the DHN will be required as a well as analysis of the Southall Waterside development to identify potential diversion requirements. It is also critical that these assessments are undertaken in parallel with the transport infrastructure planning as there may be an opportunity to reduce costs if the pipework is installed at the same time as the South Road Bride Extension works.

Great West Corridor

The Great West Corridor Local Plan Review (2019) states that new development will be expected to meet its own physical infrastructure needs including on-site utilities. An energy assessment should therefore be undertaken to identify the future demand of the Opportunity Area to ensure that energy centres and plant rooms within the new developments are sized accordingly to supply sufficient low carbon energy to the new homes. On-site renewables and low carbon technologies should also be priorities such as rooftop PV and heat pumps to reduce carbon emissions aligning with the London targets. In October 2020, using funding accessed from the GLA RE:FIT Programme, Hounslow Council commissioned a high level review of district heat network opportunities. A number of sites were identified across the borough as having high level potential for district heat networks, in particular Hounslow Town Centre, Feltham and GWC. These clusters are being further investigated as part of an energy masterplan for the borough which will be developed in Spring 2021.

West of Hounslow

Hounslow Council has ambitious plans to utilise rooftops for solar PV and develop solar farms on land that they own. The Council estate contains thousands of rooftops, providing a large surface upon which Solar PV can be installed. For every 5MW installed, approximately 1,500 homes cab be powered for a year, saving 2,150 tonnes of CO_2. Further, Hounslow proposes two solar farms – at the

[164] *Hayes Housing Zone Development Infrastructure Study*, LB Hillingdon (2017)
[165] *Infrastructure Delivery Plan*, LB Hammersmith ad Fulham (2016)

Eastern Perimeter of Heathrow for private wiring direct to the Airport to a 3MW capacity, and a Western International Market substation linkage at 9.4MW – of relevance to the Opportunity Area

Challenges to realising decentralised energy

Engagement with energy and environment teams has identified a number of challenges for energy within the Opportunity Areas, which include[166]:

- Existing capacity issues at Park Royal with regards to electric vehicle infrastructure and heating;
- Power shortages and black-outs reported, including the Park Royal area;
- Lack of clarity regarding funding for new heat networks;
- Lack of clarity on energy storage and how to balance grid and reduce peak demand;
- Lack of clarity on the combined demand from Electric Vehicle Charing;
- The need for a flexible plan for local area distribution and storage; and
- Lack of finance and resources to facilitate the transition to zero carbon at the local authority level.

The challenges identified traverse all of the Opportunity Areas. Lack of funding and unclear delivery are frequently highlighted as the primary threats to future infrastructure development and need to be addressed with a clear investment framework and implementation programme, if the identified needs highlighted in below are to be realised successfully to enable West London to achieve its carbon reduction targets. The challenges that need to be addressed through effective delivery are further detailed in Section 7.

4.3.5. Identified needs and options

In addition to district heat networks, boroughs should also seek to investigate opportunities from secondary heat sources and renewable technologies to provide supply to new developments. For example, renewable heat from ground source heat pumps and on-site renewable generation for example through solar rooftop PV arrays and thermal reservoirs. Secondary heat sources may include utilising waste heat from the planned underground train stations and transport networks all of which will reduce demand on the grid and reduce carbon emissions. For strategic areas like Heathrow, a thermal strategy is already being developed which seeks to utilise thermal storage to store waste heat in the summer and recover it for use in winter which in turn reduces peak demand and therefore plant capacity and network requirements. Hounslow has set out proposals for solar power farms near Heathrow, and there is an opportunity for boroughs to work together to develop solar farms or develop a policy position on this so that options can be developed and taken forward especially on areas of land that cross borough boundaries. This will support the procurement of energy to move from the grid to renewable sources over time.

The Opportunity Areas that are looking to implement decentralised energy schemes will create more flexible systems which can balance local production and consumption across a number of generation sources. The systems integrate renewable energy sources, multiple carriers i.e. hydrogen, heat and electricity, storage and conversion technologies such as heat pumps which can supply a range of building typologies from single homes to groups of buildings and large communities as well as for EVs and potential future hydrogen powered heavier vehicles.

In addition to reduced operating costs, increased flexibility and maintenance, decentralised energy systems also result in higher efficiencies due to reduced losses across transmission and distribution networks due to the supply being located in close proximity to the demand centres. Where possible, all future developments should prioritise district heat networks and decentralised energy systems in the first instance aligning with the London Plan's energy policies.

As demand increases due to population growth, energy storage will be critical to ensure security of supply, to balance the grid and to support renewable energy generation whereby electricity generation is intermittent depending on the resource for example wind and solar energy. All Opportunity Areas and residential development should therefore include the provision of storage whether that be battery or thermal to ensure that a resilient supply of energy across the lifetime of the development.

[166] SIDP engagement: OPDC Environment Team (September 2020); Ealing energy colleagues (September 2020)

There should also be a prioritisation of retrofitting the existing housing stock to reduce energy consumption and carbon emissions. Research commissioned by Historic England revealed that carbon emissions can be reduced by more than 60% by 2050[167] as a result of refurbishing and retrofitting older properties compared with building from new. The level of intervention should be determined based on accurate metered data that shows the performance of the existing buildings. In some cases, the retrofitting required to reduce carbon emissions and energy consumption associated with existing developments may include replacing the gas boilers with electric boilers or air source heat pumps, which although have a higher CapEx, have greater savings in the longer term over the lifetime of the asset due to lower operational costs. This would reduce the current gas consumption identified in Section 4.3.2 in all seven boroughs and therefore the carbon emissions across the boroughs. However, in some cases, particularly in older buildings more significant intervention may be required for example replacing all plant with high efficiency units for example air handling units and extract fans and replacing all water fixtures with low flow fittings to reduce consumption. It will be the responsibility of the local planning authorities to prioritise and identify which existing buildings will contribute the most significant carbon and energy consumption saving if refurbishments are undertaken. Funding will also need to be identified for these interventions.

Energy from waste is another strategic opportunity within West London, and the West London Waste Plan will help identify potential locations to develop infrastructure that can utilise waste for energy generation and local distribution.

Document review, engagement and consideration of future trends, challenges and development requirements in SIDP have identified the following energy needs. Where timelines have not been specified from review or engagement, the SIDP West London development trajectory (Section 5.3) has been used to suggest a delivery timeline.

Table 4-7 Strategic Energy Infrastructure Needs

Proposal	Description	Suggested delivery	Cost est.	Strategic growth areas	Sources
Hayes district heating network	Building on the Nestle site heating network (committed) for rest of Hayes, with energy centre	2020-25		Hayes	HHZ Development Infrastructure Study 2017
Brent Cross district heating network	Combined Heat and Power and Combined Cooling	2021-26	Brent Cross district heating network	Brent Cross/ Cricklewood	Barnet IDP 2021
OOC/ Park Royal area electricity network	Old Oak North Substation plus new substations to be determined	OPDC 0-20 years	£40m+	OPDC area	OPDC IDP 2021
OOC/ Park Royal area cooling	Area wide cooling network solutions	OPDC 0-20 years	To be determined	OPDC area	OPDC IDP 2021
OOC/ Park Royal district heating	Strategic Area-wide District Heat Network – heat extraction from sewer network and other sources	OPDC 0-10 years	£50m	OPDC area	OPDC IDP 2021
OOC/ Park Royal decentralised energy	Site Specific Decentralised Energy Delivery. Supported with Scrubs Lane Energy Centre. With rooftop PVs supporting industrial uses	OPDC 0-20 years	To be determined	OPDC area	OPDC IDP 2021
Southall Decentralised Energy Network	A district heating network, with large energy centre housing boilers and gas engines producing combined heat and	2023 onwards	£10m+	Southall	Previous feasibility, SIDP assessment

[167] *There's no place like old homes – re-use and recycle to reduce carbon*, Historic England (2020)

Proposal	Description	Suggested delivery	Cost est.	Strategic growth areas	Sources
	power. Pipe network to Southall East				
Colindale/ Burnt Oak combined heat and power	Could include energy from waste or ground source heat	2023-28 as per OA trajectory	To be determined	Colindale / Burnt Oak	SIDP basis
Wealdstone Town Centre district energy	With Harrow and Wealdstone district energy connection	2024 onwards, as per OA trajectory	To be determined	Harrow and Wealdstone	
Earls Court and West Kensington district heating network	Heat pipe plant and networks, number of energy stations to be defined.	as per emerging OA trajectory	To be determined	Earls Court and West Kensington	
White Centre combined power and district energy network extensions	Heat pipe plant and networks, number of energy stations to be defined to build on existing provision. Rooftop PVs and heat pumps to be utilised.	2021 onwards as per OA trajectory	To be determined	White City	Hammersmith and Fulham IDP (2016), applicant Sustainability Statements
Wembley combined heat and power and district energy network	Heat pipes to connect to wider network, number of energy stations to be defined. Rooftop PVs and heat pumps to be utilised.	2024-30 as per OA trajectory peaks	To be determined	Wembley	
Great West Corridor energy centres and distribution	Rooftop PVS and heat pumps to be utilised alongside network to provide low carbon energy from wider Hounslow area.	2024-30 as per OA trajectory peaks	To be determined	Great West Corridor	Draft Hounslow IDP 2020
Hounslow renewable energy generation	2 solar farms – at the Eastern Perimeter of Heathrow for private wiring direct to the Airport to a 3MW capacity, and a Western International Market substation linkage at 9.4MW.	2022-2028	£8m+	Heathrow, West of Hounslow	Draft Hounslow IDP 2020
Electric vehicle charging hub infrastructure – energy supply	Focus on rapid super charging hubs and induction charging at Opportunity Area centres. Respond to emerging electric or hydrogen HGV developments e.g. Hounslow solar projects could be used for Heathrow EVs and Opportunity Area decentralised and renewable energy for EVC hubs	2020-35	To be determined	Cross OAs Potential initial focus at OOC/ Park Royal, Heathrow – Great West Corridor, Brent Cross	SIDP basis

Section 5.2 provides the categorisation of these energy needs, and Section 6 considers energy in the delivery and funding approach.

4.4. Water

The following sub-section provides an overview of the baseline position for water infrastructure in West London, before considering the strategic needs.

4.4.1. Strategic policy priorities

In March 2020, the government published a 'National Framework' that looks at the country's need for water as whole – to supply homes and businesses, industries and the environment. It considers the long-term challenges facing all water-using sectors, forecasts the need for water both nationally and regionally, and sets the focus for planning future water supplies at a regional level, looking beyond individual water company boundaries. Through the Water Resources in the South East (WRSE) group, Thames Water and Affinity Water are now working more closely with the four other water companies located in the south east of England to develop a multi-sector, regional resilience plan. This plan will be the foundation of water company's next Water Resources Management Plans, to be published for consultation in 2022.

4.4.1.1. London

The London Plan Policy S1_5 for water infrastructure states that Development Plans should promote improvements to water supply infrastructure to contribute to security of supply. This should be done in a timely, efficient and sustainable manner taking energy consumption into account. Development Plans should:

- Minimise the use of mains water at residential developments, in line with the Optional Requirement of the Building Regulations, for mains consumption of 105 litres or less per person per day.
- Achieve at least the BREEAM 'excellent' standard for the 'Wat 01' water category or equivalent (commercial development).
- Incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future-proofing.

Regarding water quality, Development Plans should:

- Promote the protection and improvement of the water environment in line with the Thames River Basin Management Plan and take account of Catchment Plans.
- Support wastewater treatment infrastructure investment to accommodate London's growth and manage climate change impacts. New smart technologies will need to be taken into account alongside intensification opportunities on existing sites, working with Thames Water for wastewater infrastructure requirements.

Development Plans should also demonstrate that they have considered the opportunities for integrated solutions to water-related constraints and infrastructure provision within strategically or locally defined growth locations. This would require an integrated and collaborative approach from developers and could for example lead to the establishment of local water reuse systems or integrated drainage networks. Integration with the planning of green infrastructure could deliver further benefits.

4.4.2. Current provision and challenges

4.4.2.1. Water supply

West London is covered by Thames Water and Affinity Water's supply areas. Affinity Water supplies water to the London Boroughs of Harrow and Hillingdon and parts of the London Boroughs of Barnet, Brent and Ealing[168]. Thames Water covers the remaining areas of West London.

Thames Water's London Water Resource Zone (WRZ) is supplied primarily (80%) from the surface water resources of the River Thames and River Lee, either directly or via storage reservoirs. The remainder of the supply is made up of groundwater abstractions, particularly from the chalk aquifer under south east London. Thames Water is also able to abstract and treat brackish estuarine water at

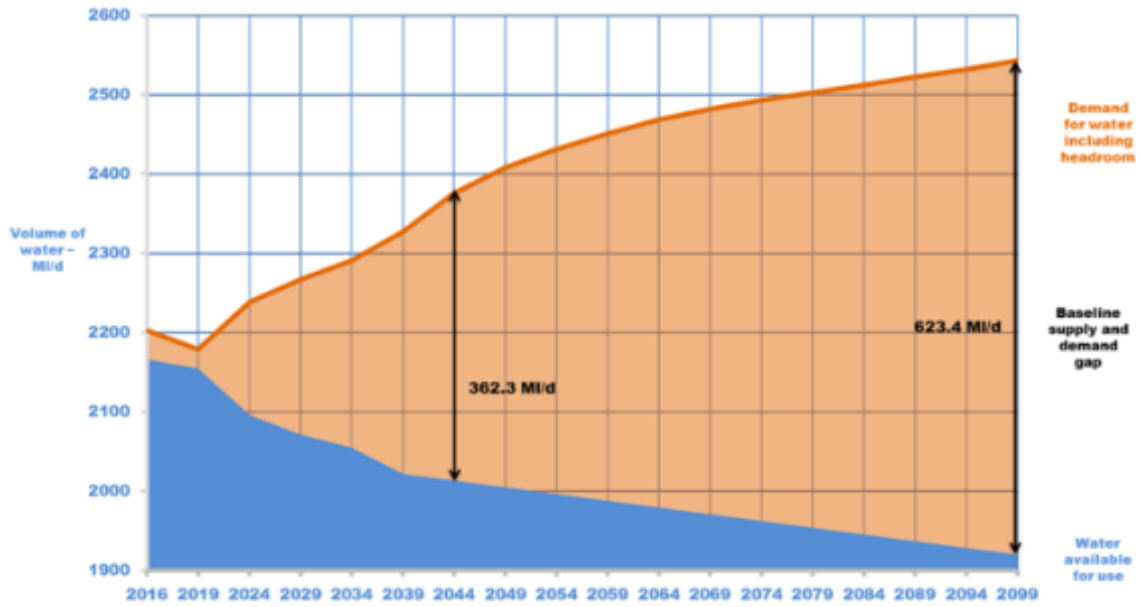
[168] Affinity Water webpage. Accessed at: https://www.affinitywater.co.uk/retailers/about-us

its desalination plant at Beckton. The water is transported to water treatment works and then treated water is conveyed to an integrated distribution system, a key feature of which is the Thames Water Ring Main. This is a large diameter pipe that runs underneath central London and connects the Thames and Lee systems and allows Thames Water to supply the London WRZ flexibly. London is a net exporter of water, with large bulk supplies provided to Essex and Suffolk Water and Affinity Water[169].

Affinity Water abstracts approximately 65% of water from groundwater sources and the remainder is from surface water, principally from the River Thames. It also receives water from and provides water to neighbouring water companies[170].

The South East of England is classified by the Environment Agency (EA) as being in 'serious' water stress. There is a significant supply-demand deficit against the dry year annual average (DYAA) demand in the London WRZ throughout the planning period (Figure 4-9). Without investment, security of supply would not be maintained. The deficit is largely driven by the combination of population growth and reductions in raw water availability due to the impacts of climate change.

Figure 4-9 Baseline supply demand balance for London WRZ (DYAA)[171]



In Affinity Water's Central region[172],as a result of planning to reduce abstraction from Chalk catchments and to improve its resilience to drought events, a shortfall in supply under drought conditions of 43 million litres per day (Ml/d) by 2025, rising to 256 Ml/d in 2080, is anticipated (Figure 4-10). Available water supplies continue to fall throughout this time due to the impacts of climate change and population growth. Affinity Water forecasts approximately 1.6 million more people in their Central region by 2080.

[169] *Final Water Resources Management Plan 2019. Technical Appendices. Appendix D: Water resource zone integrity*, Thames Water (2020)
[170] *Water Resources Management Plan 2020-2080*, Affinity Water (2020)
[171] *Final Water Resources Management Plan 2019: Section 0: Executive summary*., Thames Water (2020)
[172] Covers Hertfordshire, west Essex and parts of Bedfordshire, Berkshire, Buckinghamshire, North London and Surrey

Figure 4-10 Affinity Water's Central region outlook

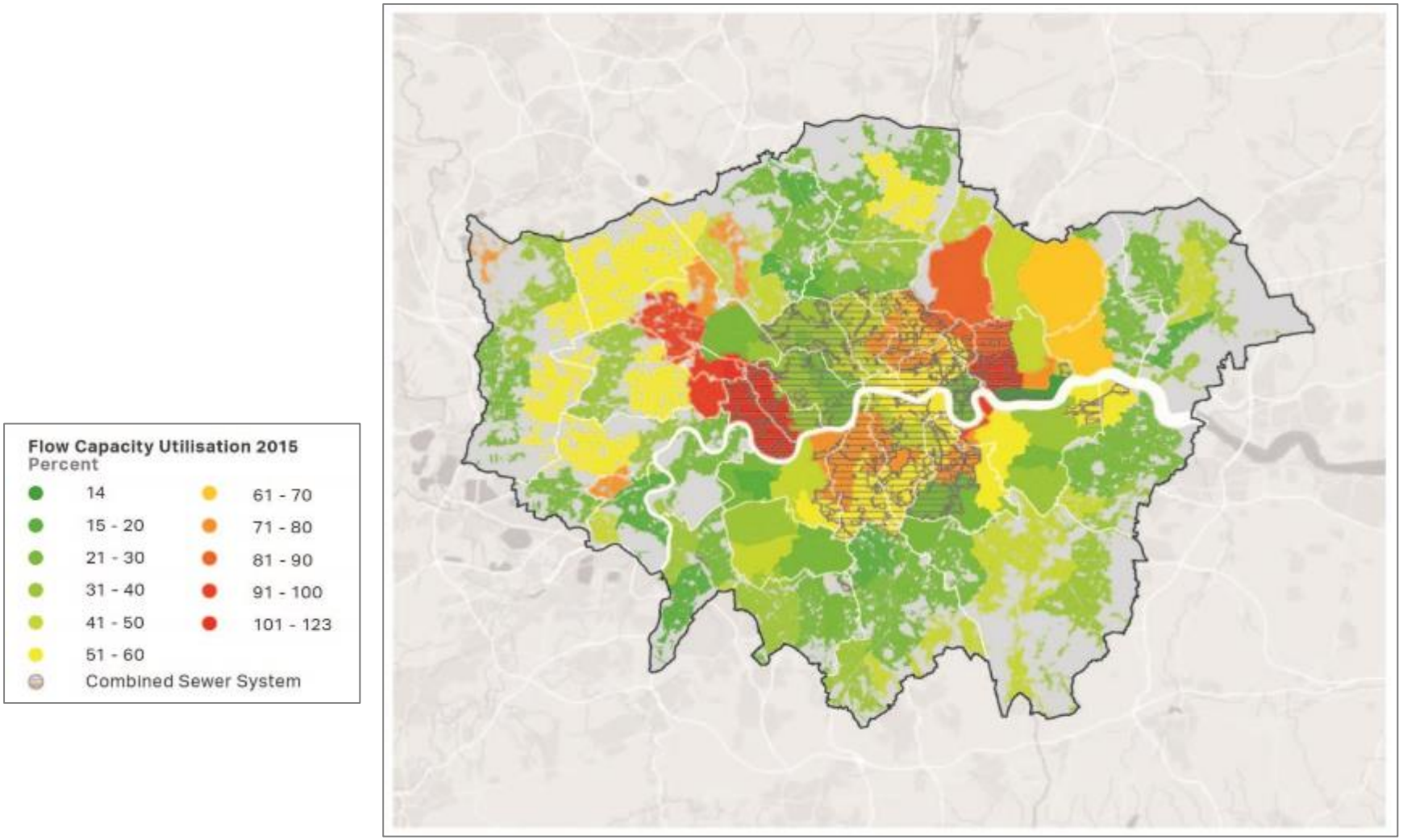
Thames Water data indicates current domestic water consumption is above target levels for new properties. It has expressed support to improve water efficiency of new homes, as per the London Plan requirement for large developments to meet higher performance levels (fittings-based approach outlined in Building Regulations Part G). Londoners consume on average 149 litres per head per day (l/h/d) – approximately 8 litres above the national average[173]. The London Plan sets a 105 l/h/d standard for new domestic properties. Existing metered properties perform better, with an average of 121 l/h/d compared to a 159 l/h/d property average for London[174]. A strengthening of these building requirements may be necessary, with post-build inspections, alongside the increased use of technology such as greywater reuse and rainwater harvesting with smart water metering and incentives.

4.4.2.2. Wastewater and sewerage

Wastewater services in West London are provided by Thames Water. The Urban Wastewater Treatment Directive drives improvements in wastewater treatment infrastructure. The wastewater drainage capacity has been mapped across London and is presented in the London Plan[175]. This shows Hammersmith and Fulham and areas of south Ealing and central and south Brent as having capacity utilisation above 80% and up to and over 100%. These areas in particular relate to the OOC/ Park Royal, Wembley, White City and Earls Court and West Kensington Opportunity Areas. Other areas with lower capacity utilisation may still require drainage infrastructure investment as these areas may flow into higher utilised areas.

[173] *London Plan,* GLA (Dec 2019, Intend to Publish version), paragraph 9.5.1
[174] *Water Resources Management Plan,* Thames Water (2019)
[175] *London Plan* (Dec 2019), GLA paragraph 9.5.14; Thames Water Sewer Capacity Map 2020

Figure 4-11 Drainage network capacity (2018)[176]



[176] *London Environment Strategy,* GLA (2018); *London Plan*, GLA (Dec 2019). Paragraph 9.5.12, source Thames Water

An upgrade project was completed at Mogden Sewage Treatment Works (STWs) in Hounslow to increase treatment capacity by around 35% and reduce the volume of untreated stormwater flows being discharged to the River Thames to meet more stringent water quality targets[177]. The upgrade was designed to accommodate growth to 2021. The STWs forms a key part of West London's sewage treatment system[178]. Further improvements to Mogden STW were identified in Thames Water's 2020-25 funding application to Ofwat.

4.4.2.3. Drainage

Thames Water, the West London boroughs, the Environment Agency, Transport for London, Highways England and private landowners all have drainage responsibilities in West London. Sustainable drainage measures are important in areas with poor sewer capacity and in managing surface water, fluvial and sewer flooding caused by heavy rainfall events which are expected to increase due to climate change.

The London Sustainable Drainage Action Plan[179] is an important reference document in promoting the implementation of sustainable urban drainage systems (SuDS) to build resilience into the sewer infrastructure network and to reduce flood risk. This Plan has also informed Section 4.4.4 for Flood Mitigation and Section 4.5.4 for Green Infrastructure.

4.4.3. Planned and proposed strategic infrastructure

Similar to other utilities, water infrastructure investment is constrained by the nature of companies' investment plans and where investment is needed ahead of development site delivery.

Thames Water and Affinity Water have an obligation to meet domestic water demand. For commercial development, there is no such obligation and collaboration is important to ensure provision.

The strategic plans for Thames Water and Affinity Water are set out below for water supply, followed by wastewater and drainage.

Water supply

Approach to growth - Thames Water input

Thames Water identified their general approach to growth in West London[180], whereby:

- Thames Water use information in the public domain to best plan water and waste infrastructure, where the plans have utilised the latest available development plans and population forecasts.
- This planning uses a combination of local plan information, planning application information and information gathered from developers.
- This information is then used for Thames Water's business plan, of which the current plan runs from 2020–25 and was pulled together through 2018-19. It was recommended that the latest available plans were referred to.
- It is recognised that a lot of assumptions that were made to inform that plan will need to be reviewed in light of the COVID-19 pandemic.
- Thames Water confirmed that they do not speculatively install infrastructure as they require certainty that development is going ahead where Local Plan inclusion and planning approval may not be sufficient for them to deliver the implied infrastructure need.
- However, Thames Water aims not to hold up development and as such a balancing act is important.
- Thames Water will look to deliver strategic solutions serving multiple developments; however, the phasing of such development may be uncertain and therefore they may choose to deliver on a more site-specific basis.
- Overall, their planned water supply upgrades for development are an ever-moving response from a network perspective.

[177] *Strategic Infrastructure Plan,* LB *Hillingdon* (2017)
[178] *Infrastructure Development Plan*, LB Barnet (2011)
[179] *London Sustainable Drainage Action Plan,* GLA (2016)
[180] SIDP engagement: Thames Water (September 2020)

- STWs and water treatment works can be given greater clarity as regardless of where the growth occurs in the boroughs it will be served by a smaller number of works which are easier to identify and plan.

Thames Water has developed a preferred plan to manage water supply and demand through a combination of demand management and resource development options. Table 4-8 below summarises this preferred plan.

Table 4-8 – Thames Water's preferred plan

Timescale	Option type	Options
Short term (2020-25)	Demand management	• Progressive Metering Programme (PMP) with 365,000 household meters being installed in AMP7 achieving total household penetration of 59%. • Introduction of a reward based incentive scheme in AMP7 to promote water efficiency. • Reduce leakage • Continue to promote water efficiency activity to help customers use water wisely.
	Water resources development	• Water trading agreement with RWE NPower to provide a deployable output gain of 18 Ml/d from 2020 to 2025. • Release of a network constraint in the Lee Valley to yield 3 Ml/d additional benefit from existing sources in 2020, together with the development of new groundwater schemes providing approximately 13 Ml/d additional water available for use from 2024.
Medium term (2025-45)	Demand management	• Continue to roll out PMP to deliver a further 320,000 meter installations by the end of AMP8 (2029/30), achieving 73% of individual household smart meter penetration in London WRZ. • Deliver a further 141.7 Ml/d leakage reduction. • With company meter penetration at >70%, implement a financial incentive based tariff scheme from 2035. The scheme will incentivise lower household consumption and assumes a 5% reduction in usage.
	Water resources development	• Delivery of further innovative groundwater schemes, the Deephams wastewater reuse scheme, Oxford canal raw water transfer and release of network constraints in South London, providing more than 75 Ml/d DO benefits for supply in London from 2030 onwards. • Extension of the existing water import trade with Essex and Suffolk Water, due to expire in 2035, until 2060. • 150 Mm^3 South East Strategic Reservoir in Oxfordshire in 2037/38 to secure long-term resilience. This solution allows us to maintain supply resilience and be able to support WRSE 100 Ml/d regional raw water demand from Affinity Water. • Reduce existing abstraction at Waddon, North Orpington and New Gauge sources to improve flows in the River Wandle, River Cray and River Lee (Amwell Magna reach), respectively.

Source: Thames Water (2020) Final Water Resources Management Plan 2019: Section 0: Executive summary.

Thames Water has agreed funding to undertake further studies on five new strategic water supply options, working closely with other water companies. These include:

- A transfer of water from Wales, the Midlands and North West, via the River Severn to the River Thames;
- A new reservoir in Oxfordshire developed in partnership with Affinity Water (SESRO);
- Water reuse schemes in London;

- A transfer from Thames Water to Affinity Water; and
- A transfer from Thames Water to Southern Water[181].

The long-term leading strategic option selected through the programme appraisal process for supply to the London WRZ is the South East Strategic Reservoir in south west Oxfordshire (SESRO)[182]. The option is located to the west of London. The SESRO has been selected in Affinity Water's WRMP19 separate programme appraisal process as the best value long-term strategic option for its customers, assuming a joint promotion with Thames Water. It intends to utilise 100 Ml/d of the yield capacity of the reservoir, which it will abstract and treat for supply into the south and west of the region through staged network and treatment developments.

The replacement of aging trunk mains will also support water supply improvements. Thames Water will be making improvements to the Colne Valley Trunk, Crane Valley Trunk and Bath Road Trunk to create additional capacity to address growth in Hillingdon, Hounslow and Harrow.

Thames Water has considered a range of possible futures, some more challenging than others – such as more people living in their supply area than predicted. This adaptive planning approach helps to manage these uncertainties.

Approach to growth – Affinity Water input

Affinity Water have identified the following key points in the response to West London's growth[183]:

- Affinity Water respond to clear information from boroughs on housing and commercial development plans, with a level of certainty required, alongside developer applications to understand the projected domestic demand and adjust plans as needed.
- Where there are significant property development areas, Affinity Water will study and re-align their future plans and consider the transfer of water as required.
- The current plan basis is captured in Affinity Water's Water Resources Management Plan.
- Affinity Water are improving the network across their West London areas including Harrow, Brent, Barnet, Uxbridge, Hayes, Feltham and Southall.
- Affinity Water are working to identify potential new mains needs within Harrow and Wembley, considering the relation to HS2 project works.
- Affinity Water stated that there is a commitment, with Thames Water, to create smart meters in all housing to reduce consumer use, alongside communications on how to save water.
- Affinity Water pointed to environmentally aligned approaches to meet demands, with a focus on infrastructure for buildings to recycle water where possible and to consider the incorporation of water efficiency level communication on appliances.
- Affinity Water pointed to the need for SuDS to be considered within development to protect environmental assets, and opportunity for roof water collection for lower quality water demand including property flushing.
- Affinity Water also stated the importance of incentivising developers to support the need to reduce demand and increase water re-use.

Affinity Water aims to reduce demand through leakage reduction and reducing per capita consumption (PCC):

- **Leakage** – 18.5% leakage reduction within the 2020 to 2025 period. In the longer-term Affinity Water aims to achieve an overall level of 50% leakage reduction between 2015 and 2045. Also included further ambition to reduce leakage by a further 7% (to 57% from our 2015 position) so that the company achieves 50% reduction from our 2020 target, by 2050.
- **PCC** – PCC target for consumption in a 'normal year' of 129 litres/person/day (l/h/d) by 2025 (compared to 2016/17 average consumption of 152 l/h/d). Affinity Water then propose to continue to further reduce PCC through concerted action on water efficiency and smart

[181] *Shape your water future. Our Water Resources Management Plan 2020-2100,* Thames Water (2020)
[182] *Shape your water future. Our Water Resources Management Plan 2020-2100,* Thames Water (2020)
[183] SIDP engagement: Affinity Water (September 2020)

metering. This ‘concerted action’ is aimed at developing wider collaboration. It includes aspirations to reduce this further (potentially as low as 110 l/h/d), depending on industry wide and policy support for demand management, involving measures such as mandatory water efficient labelling and retailing of white goods and fittings.

In terms of supply, there are some key interventions planned across smaller resource options, imports from Anglian Water, internal transfers and strategic supply options.

Affinity Water is investigating the potential of the Lower Greens and abstractions to provide 6 Ml/d in the medium term (between 2025 and 2035). The existing Canal & River Trust reservoir in Brent could also be utilised to deliver up to 7.5 Ml/d into the west of the region.

Currently, Affinity is only able to make use of around 50Ml/d of its shared resource with Anglian Water. Installation of a conditioning plant and network storage will make use of 91Ml/d (full capacity) by 2025 (pre impact of climate change). **T**he “Supply 2040” programme will also enable internal transfers through the building of better inter-connectivity throughout their Central region to remove constraints within the distribution network that will allow them to ‘unlock’ and transfer 17 Ml/d of existing capacity from the south west of the Central region by 2025.

Further, a Grand Union Canal import option will transfer 50Ml/d of treated wastewater from the Birmingham area for treatment and supply into the west of its region. Under its current ‘best value plan’ it anticipates needing this resource by 2065.

The identification of supply side options was carried out in collaboration with regional water industry groups such as Water Resources in the South East and Water Resources in the East, and in liaison with third party partners such as the Canal and River Trust.

Affinity Water’s Plan for the Central region also includes a detailed ‘adaptive strategy’, which identifies how Affinity will monitor and respond to uncertainties, along with up-front investigative activities and investments that will be undertaken to ensure it can deliver any adaptations in a timely manner. It anticipates that it will require the first strategic development by 2038[184].

Wastewater and drainage

Thames Water is working with property owners to reduce the number of misconnections where untreated sewage flows into a drain rather than a sewer, and then into a river[185]. The Thames Tideway Tunnel is also being built to prevent 39 million tonnes of diluted but untreated sewage being released into the Thames every year, improving water quality. Thames Water’s London 2100 plan will identify the most appropriate strategy for ensuring London’s drainage and wastewater systems can meet the needs of London over the next 80 years in the most sustainable way.

4.4.4. Strategic need

These strategic needs complement the planned infrastructure highlighted in this section. There are important interactions with flood management, with the flood infrastructure section below.

Effective water resource planning is essential to ensure the long-term balance between supply and demand is maintained in West London. Every five years statutory water resources management plans (WRMPs) set out a water company’s intended approach for at least the next 25 years[186]. Thames Water and Affinity Water’s latest WMRPs go beyond this, covering the period 2020-2100 and 2020-2080 respectively. Forecasts of demand are based on population and property projections provided in the London Plan and Local Plans, and therefore include Opportunity Area growth.

A review of Thames Water and Affinity Water’s WRMPs revealed that both have set out demand-side and supply-side options to meet future demand for water and timescales for their implementation. Both water companies are working to ensure Londoners use water wisely, for example, reducing leakage from water mains, installing smart water meters and improving the water efficiency of homes and businesses. In collaboration with the Greater London Authority and the Environment Agency, both water companies are looking at the long-term water supply options for London, such as the South East Strategic Reservoir in Oxfordshire, and assessing their resilience to challenges such as

[184] *Water Resources Management Plan 2020-2080,* Affinity Water (2020)
[185] *London Infrastructure Plan 2050,* GLA (2015)
[186] *Water Resource Planning webpage,* Ofwat. Accessed at: https://www.ofwat.gov.uk/regulated-companies/resilience-2/water-resource-planning/

population growth, climate change and energy prices. Through the Water Resources in the South East (WRSE) group, Thames Water and Affinity Water are now working more closely with the four other water companies located in the south east of England to develop a multi-sector, regional resilience plan. This plan will be the foundation of both water companies next WRMP, to be published for consultation in 2022.

In addition, Thames Water and Affinity Water are mapping the capacity of their water mains and are identifying areas where investment is required to improve the water supply capacity to support growth[187]. The Mayor is also working with Ofwat, the water regulator in England and Wales, and HM Treasury to ensure that water infrastructure in complex sites can be planned and funded[188].

Wastewater and drainage system need – Thames Water[189]

Thames Water has also identified a need to safeguard sewerage systems from groundwater, where unwanted flows impact the environment through pollution or flooding that impacts their customers. Thames Water is working towards minimising groundwater infiltration with other stakeholders such as the EA, where this is a long-term issue that requires a coordinated and sustained approach. Groundwater Impacted System Management Plans are being produced which will outline short-term mitigation and long-term plans to deal with infiltration in priority areas. The majority of the sewerage network is only designed to deal with foul / wastewater and the issue presented by groundwater infiltration is often compounded by surface water getting into foul-only systems.

Thames Water has stated the importance of the drainage hierarchy where surface water is discharged to combined (and foul) sewers only as a last resort and full consideration is given to other means of surface water drainage. It is recognised that developers may make requests to connect surface water to a foul-only sewer rather than bear the costs to connect to the nearest surface water system or to consider SuDS use. A long-term solution may need to be developed, which will include requests on developers to put measures in place to protect drainage infrastructure.

Drainage and Wastewater Management Plans (DWMPs) are the new way for organisations to work together to improve drainage and environmental water quality. DWMPs provide the basis for more collaborative and integrated long-term planning by organisations that have interests and/or responsibilities relating to drainage, flooding and protection of the environment. Water and sewerage companies in England and Wales will publish draft DWMPs in the summer of 2022[190].

The indicative growth of the Opportunity Areas with the determined housing needs across West London brings water demand pressures as well as opportunities to install infrastructure to support water efficiency and water re-use. Significant commercial water consumers exist within West London at present and this will grow with the Opportunity Area focus for commercial space development, particularly at Park Royal, the Great West Corridor and White City. This brings more acute issues on water supply, in combination with climate change, and there will be a need to further remove stormwater with sewer infrastructure being over capacity. The re-use of surface water and the application of SuDS are important to free up sewer capacity and to help meet the water demand from residential and commercial development. Going forward, water efficiency measures will become increasingly critical.

Given the distribution of proposed growth in West London, driven by the Opportunity Areas, there are some notable areas of increased demand in future years including:

- Park Royal – a significant employment space growth area where increased water demand impacts industrial users. Infrastructure capacity could pose constraints on the growth of industry here.
- The A5 Corridor, across Affinity Water and Thames Water supply areas, with significant growth in Brent Cross/ Cricklewood, Colindale/ Burnt Oak, the west of Brent sites and Harrow sites to the North West. Thames Water has indicated that Colindale is as an area of concern and that investment in trunk main and pipe upgrades may be needed to increase capacity.

[187] *London Infrastructure Plan 2050,* GLA (2015)
[188] ibid
[189] SIDP information: Thames Water communication with boroughs
[190] Working together to improve drainage and environmental water quality, Water UK (2019). Accessed at: https://www.water.org.uk/wp-content/uploads/2019/09/Working-together-to-improve-drainage-and-environmental-water-quality-an-overview-of-Drainage-and-Wastewater-Management-Plans.pdf

- Hammersmith and Fulham has been identified as having high sewer capacity utilisation with areas above 100%. These need to be addressed in supporting White City and Earls Court and West Kensington Opportunity Areas.
- Central and south Brent are also identified as having capacity utilisation above 80% which will need to be addressed to enable the OOC/ Park Royal and Wembley OAs growth.

Commercial water needs and efficiency – First Business Water input[191]

First Business Water indicate that West London's largest water consumers are typically large industrial businesses and it is recognised that non-residential demand contributes around a third of the national total water demand. Commercial water use is both a critical need and has a critical role in improving water efficiency and enabling the future resilience of water supply. Defra has been working on initiatives such as water efficiency aims, but this work has been delayed and is expected to restart in spring 2021. Waterwise is the key authority on reducing water use, supporting emerging industry consensus on the importance of water efficiency and initiatives.

There are some notable challenges to this progress. Firstly, water use is not high on the priority for commercial budgeting with the relatively low costs of water use and alternate incentives may be required to reduce commercial usage. Secondly, the lack of usage data is a barrier for the market, retailers, suppliers and end users. The lack of identification of the largest users and where performance has been improved is an issue with poor meter reading and data consolidation. Smart metering is an important measure to address data gaps, and support initiatives such as commercial building ratings for water use, awareness campaigns and behavioural change.

For new development, alongside smart metering, rainwater recycling and grey water re-use are important interventions in the short to medium term.

The London Plan sets a 105 litres per household per day (l/h/d) standard for new domestic properties. Existing metered properties perform better, with an average of 121 l/h/d compared to a 159 l/h/d property average for London[192]. A strengthening of these building requirements may be necessary, with post-build inspections, alongside the increased use of technology such as greywater reuse and rainwater harvesting with smart water metering and incentives.

There is a role for sub-regional collaboration to address these challenges and support future resilience.

4.4.5. Identified needs and options

Table 4-9 below sets out the infrastructure needs that have been identified. These are significant due to their cross-boundary or Opportunity Area supporting role. Flood focused schemes are presented in Section 4.5.4.

Table 4-9 – Strategic Water Infrastructure Needs

Proposal	Description	Suggested delivery	Cost est.	Sources
Cross OAs: water supply	Water supply reinforcement, renewal and maintenance of infrastructure. Thames Water and Affinity Water plan to meet growth Particular needs: Trunk mains development near A41 Brent Cross/ Cricklewood; under West Coast Mainline (Brent); the Colne Valley and Crane Valley Trunks to meet growth need (Hayes, Hillingdon);	As per OA schedules	Not determined – providers to meet	

[191] SIDP engagement: First Business Water (October 2020)
[192] *Water Resources Management Plan,* Thames Water (2019)

Proposal	Description	Suggested delivery	Cost est.	Sources
Cross OAs: sewer infrastructure	Sewer infrastructure reinforcement, renewal and maintenance. Thames Water plan to meet growth Particular needs: Wembley (high capacity utilisation); A41 and A5 corridors; Hammersmith and Fulham (high capacity utilisation)	OA schedules	Not determined – providers to meet	
Cross OAs: water re-use	Development water re-use: Rainwater harvesting and greywater recycling systems. Particular use for commercial areas and alongside flood mitigation for development sites (flood priorities below)	OA schedules	Not determined – developers to meet	

Section 5.2 provides the categorisation of water and flood management needs, and Section 6 the delivery and funding approaches.

4.5. Flood management

4.5.1. Strategic policy priorities

The requirements of the National Planning Policy Framework (NPPF) and the Planning Practice Guidance state that all developments need to demonstrate that they will be resilient to flooding and coastal change. Residential developments have a minimum lifetime of 100 years, as defined by the PPG. However, non-residential developments require planners and developers to assess their lifetime as they are defined by individual characteristics. This should be achieved through flood risk and drainage management at development master planning stage to reduce local flood risks to and from development sites.

Achieving these objectives is vital in ensuring that the flood risk impact of future growth is mitigated as much as possible. Protecting land used for flood mitigation can help enable or unlock other land for development that might not otherwise have been suitable under the PPG's vulnerability table[193]. This provides opportunities for strategic flood risk management approaches which the boroughs' Lead Local Flood Authorities (LLFAs) are actively taking, through partnership working, to safeguard future land.

4.5.1.1.1. London

The London Plan Policy SI_12 sets out that development should use the Mayor's Regional Flood Risk Appraisal (RFRA) and Strategic Flood Risk Assessment (SFRA) as well as Local Flood Risk Management Strategies. Flood and drainage policies are focussed on mitigating flood risk, where this can be sustainably managed through development, such as the improved management of surface water.

Development proposals should ensure:

- that flood risk is minimised and mitigated, and that residual risk is addressed;
- they contribute to the delivery of the measures set out in the Thames Estuary 2100 Plan;
- proposals for utility services are designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood;
- they protect the integrity of any adjacent flood defences and allow access for future maintenance and upgrading; and
- they employ natural flood management methods due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.

The London Plan Policy SI_13 sets out that Local Flood Risk Management Strategies and Surface Water Management Plans should identify areas where there are particular surface water management issues and aim to reduce these risks. Increases in surface water runoff outside these areas also need to be identified and addressed[194]. Policy SI_13 requires development to achieve greenfield runoff rates, and a hierarchy of drainage by gravity over pumped systems. Beyond this, drainage should be designed and implemented to promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation – reflecting the strategic integration between green infrastructure and flood mitigation.

The Mayor, Environment Agency and London Boroughs have identified the flood risk hotspots in the capital. Thames Water has modelled the capacity of its sewer system to manage future challenges and identified areas where flooding from the sewers is likely to become unacceptable in the future (shown in Figure 4-11). The London Sustainable Drainage Action Plan (2016) has been developed to support a step change in how rainwater is managed.

4.5.1.1.2. West London

The West London SFRA has been developed for six of the seven boroughs - Barnet, Brent, Ealing, Harrow, Hillingdon and Hounslow. The combined area features several cross-boundary Environment

[193] *West London Strategic Flood Risk Assessment*, WLA (2018)
[194] *London Plan*, GLA (Dec 2019). Policy SI_13

Agency designated Main Rivers, including the Dollis Brook, Duke of Northumberland's River, River Brent, River Crane, River Colne, River Lee, River Pinn, River Thames and Yeading Brook.

As well as assessing flood risk and setting out responsibilities, the SFRA set out recommendations for boroughs at a site specific level[195]. Key recommendations include the following:

Borough wide

- adopt a sequential approach for planning and development to identify areas that are not susceptible to flood risk impacts posed by climate change. Development should be encouraged in these identified areas to make properties more resilient to increasing flood risk;
- make space for water storage by identifying strategic locations that are required for current and future flood risk management, and safeguard this land via Local Plans;
- adopt a Catchment Based Approach to ensure recognition of catchment wide flood issues to justify the collection and use of S106 funding to investigate and develop flood alleviation schemes within the catchment the development falls within;
- set up mechanisms to enable the use of CIL charges to be used for flood alleviation schemes across the borough to address the cumulative impact of development on flood risk; and
- use Local Plans to ensure developments within Critical Drainage Areas (as defined by Surface Water Management Plans) provide increased surface water drainage requirements, such as increased storage through the use of SuDS to restrict off-site runoff rates to greenfield (or lower) conditions.

Site specific

- not increase flood risk elsewhere and where possible reduce flood risk overall;
- ensure that land within development sites is safeguarded for potential flood mitigation use through the active consideration of predicted flood mapping from all sources at the master planning stage;
- maximise the use of open spaces to ensure spaces for water to flow during times of flood;
- resist, where appropriate, the increase of impermeable surfaces, including small areas such as front gardens; and
- aim to incorporate permeable paving in hardstanding areas to provide flood mitigation benefits, or where geology does not facilitate infiltration then permeable paving should be underlain with gravel or feature an underground storage system.

4.5.2. Current provision and challenges

The RFRA[196] considers all sources of flood risk including tidal, fluvial, surface water, sewer, groundwater and reservoir flooding. The RFRA provides a spatial analysis of flood risk including consideration of risks at major growth locations including Opportunity Areas and Town Centres and key infrastructure assets. This has been used to inform the London Plan as well as the West London SFRAs.

The EA's revised climate change allowances (2016) consider the lifetime, vulnerability and location of a development. Therefore, the assessment of London's Opportunity Areas also considers 1 in 1000 year events, beyond the 1 in 30 and 1 in 100 year events, as a precautionary approach to reflect the revised allowances. An update to the EA's climate change allowances is due in 2021 to reflect the latest UK climate change projections (UKCP18).

Tidal flooding

The Thames Estuary 2100 (TE2100) Plan manages tidal flood risk and the Environment Agency has costed the programme to 2035. The Environment Agency manage flood risk from Main Rivers, the sea and reservoirs with responsibilities of providing flood risk regarding development proposals in Flood Zones 2 and 3, managing fluvial and coastal flood risk, facilitating works on or near Main Rivers and watercourses and providing advice on development proposals.

[195] *West London Strategic Flood Risk Assessment*, - *Section 5*, WLA (2018)
[196] *London Regional Flood Risk Appraisal* 2018, GLA and Environment Agency (2018)

Hammersmith and Fulham and Hounslow fall under Action Zone 1 (West London) in the Environment Agency's TE2100 Plan. Relevant policies here are to strategically manage flood risk from tidal and high river flow sources in the TE2100 Plan area. The Environment Agency will continue with existing or alternative actions to manage flood risk, continue to maintain flood defences at their current level where the likelihood of a flood will increase due to climate change, and will take further action to reduce the risk of flooding (now or in the future). Actions are focussed on reducing reliance on the Thames Barrier, such as flood resilience measures (e.g. flood gates) or potentially safeguarding land for future flood storage on the fluvial tributaries.

Fluvial flooding

The risk of flooding from fluvial sources is shown in the Fluvial & Tidal Flood Risk Web Map for the West London SFRA[197]. This breaks down the probability of fluvial flooding by EA's Flood Zone categories:

- Flood Zone 1 - having the lowest risk of fluvial flooding
- Flood Zone 3 having the highest risk of fluvial flooding, as 3a (high probability) and 3b (functional floodplain).

Table 4-11 below details the flood risk ratings for the Opportunity Areas, and the West London Town Centres are also considered in their flood risk levels.

Fluvial flooding is of particular note for areas in the vicinity of the Grand Union Canal, where this is linked to large fluvial catchments - including the Colne Valley and the River Brent - and may convey flood waters from fluvial source. This relates to the West London Opportunity Areas of Hayes, Southall, OOC/ Park Royal and Wembley in particular. Fluvial flooding affects parts of most London boroughs, and a number of Opportunity Areas, town centres and strategic infrastructure. Fluvial flooding has been more frequent than tidal flooding and flood plain parkland and undeveloped land should be protected.

The London management catchment area of the Environment Agency's Thames River Basin District Flood Risk Management Plan 2015-2021[198] covers 8 river systems that are considered. These include:

- the River Crane, which runs through Harrow, Hillingdon and Hounslow – though flood risk for this river is more concerned where it joins the Thames at Isleworth[199]; and
- the River Brent, which rises in Barnet and runs south-west with a catchment covering Brent, Ealing, Harrow and Hounslow – where there have been flooding events following storms and heavy rainfall, and where there have been blockages.

Other river catchments in West London include the River Colne, with a catchment area for Harrow and Hillingdon, the River Lee covering Barnet and the River Thames catchment covering Hounslow. The London catchment area has a series of actions to prevent, prepare and protect from flood risk, as set out in the Thames River Basin District Flood Risk Management Plan.

Climate change scenarios

The West London SFRA has looked at the climate change impacts on all sources of flood risk. The accompanying flood risk maps shows climate change scenarios for the Main Rivers as:

Table 4-10 – Main river climate change scenarios

River	Climate change scenario: 1 in 100 year probability event as baseline	Strategic growth link
Upper Colne	+20% peak river flow	Uxbridge; North West Harrow
Lower Colne	+10%, +15%, +25%, +35%, +70% peak river flow	West of Hounslow
River Lee	+10%, +15%, +25%, +35%, +70% peak river flow	East Barnet
Silk stream	+20% peak river flow	Brent Cross/ Cricklewood

[197] *West London Strategic Flood Risk Assessment,* WLA (2018). Accessed at: https://metis.maps.arcgis.com/apps/webappviewer/index.html?id=afb73be8cbc34364ab597aeb6a615197
[198] *Thames River Basin District Flood Risk Management Plan 2015-2021*, Thames Water (2016)
[199] *London Regional Flood Risk Appraisal* 2018, GLA and Environment Agency (2018)

River Brent	+25%, +35%, +70% peak river flow	Colindale/ Burnt Oak; Brent Cross/ Cricklewood; Wembley Southall; Great West Corridor
River Crane	+25%, +35%, +70% peak river flow	Hayes West of Hounslow
River Pinn	+25%, +35%, +70% peak river flow	Harrow and Wealdstone

Source: Strategic Flood Risk Assessment (SFRA) Level 1, LB Barnet, Brent, Ealing, Harrow, Hillingdon, Hounslow (2018)

Surface water

Surface water flooding is generally very localised and generally occurs where rainwater overwhelms the drainage system. The Environment Agency are the strategic lead for managing surface water and groundwater sources to meet the Water Framework Directive goals. However, the boroughs are the lead Local Flood Authorities (LLFAs) here, responsible for local surface water flood risk management and maintaining risk management asset registers, with the production of Local Flood Risk Management Strategies (LFRMSs).

Surface water management has been given particular focus with the London Sustainable Drainage Action Plan where this guides development plans. This complements the London Plan and contains actions to make the drainage system operate in a more natural way, with an emphasis on retrofitting. The overall vision to 2040 is: "*London will manage its rainwater more sustainably to reduce flood risk and improve water quality and security. This will maximise the benefits for people, the environment and the economy*."[200]. The LSDAP promotes the use of SuDS, including for housing, transport and schools, and demonstrates how rainwater can be used as resource instead of a waste product. West London have expressed their support for this focus with identified actions for improved SuDS application[201].

Whilst some surface water can discharge to natural drainage systems, such as rivers and streams, this needs to be a sustainable option, with pollution prevention including the use of green infrastructure. Where this is not an option in more urban areas, more sustainable rainwater management should be used, and greenfield run-off where possible. This can utilise porous road and parking surfaces, green roofs, blue roofs, rain gardens and storage (ponds, swales, soakaways). Development may need to consider wider areas where it may not be feasible to introduce mitigation at specific locations but integrating measures with new development can be more cost-effective.

To promote more effective cooperation across London Boroughs, the GLA set up the 'Drain London' project with working parties across London to share best practice and create an ongoing working partnership for managing local flood risk in the area. Drain London Group 1 includes the Hounslow, Hillingdon and Ealing, and has now merged with Group 2, comprising Brent, Barnet and Harrow to form the North West London Flood Risk Management Strategic Partnership

For highways flood risk, Highways England, TfL and the boroughs are responsible for providing and managing highway drainage, working with the Environment Agency and LLFAs. It is important to ensure that any changes to road infrastructure provide additional space for water, over and above the Thames Water required sizing, to mitigate surface water flooding through development.

Table 4-11 below sets out the surface water related flood risks and management options for the Opportunity Areas.

Groundwater and sewer flood risk

Primary responsibility for floods from water and sewerage systems (sewer flooding, burst pipes/ mains, system failures) are with Thames Water and Affinity Water as the relevant water and sewerage companies for West London.

The Thames Tideway Tunnel, under construction, will significantly boost sewer capacity and intercept overflows and transfer flows for treatment at Beckton STW. It will prevent the discharge of millions of tons of untreated sewage and rainwater to the Thames. Some of the key assets are located in West London include the existing Hammersmith pumping station; the existing Acton Storm Tanks and the most western site with one of the tunnelling completions.

[200] *London Sustainable Drainage Action Plan*, GLA (2016)
[201] *West London Strategic Flood Risk Assessment – Section 2,* WLA (2018)

Thames Water previously planned a major sewer tunnel in the Counters Creek catchment of West London, though a detailed review concluded the strategic sewer was not yet required. Thames Water will continue to consider options to support the resilience of the sewer network, considering population growth, development and climate change.

Brent is also identified as one of the boroughs in London with significant sewer flooding and pollution problems[202]. The North Brent & Harrow Catchment Study (2018)[203] considered the root causes of flooding and potential ways to reduce them across the catchment, following particular flood events in 2015. The Study set out medium to long term activities including sewerage network refurbishment, reduction of run-off from roads, roofs and parking areas and review of the catchment approach.

A key element to supporting sewer network resilience by reducing overloading and reducing foul sewer flooding risk is the use of sustainable drainage (SuDS), as noted above.

In terms of groundwater, there are no known mayor development locations where groundwater flooding has been a problem. Rising groundwater has mostly related to central and inner London, although this is now being managed[204].

Flood risk locations

Town centres have been considered for their flood risk where in West London only Hammersmith Town Centre has a risk of over 15% for a 1 in 30 year flood event. The next flood risk level, of 8-15% of a 1 in 30 year event, includes two – Edgware and Shepherds Bush – and the rest of the metropolitan and major town centres are at lower risk.

All of the Opportunity Areas have some form of flood risk. Earls Court and West Kensington Opportunity Area is identified as having the highest proportion of land in high flood risk areas (17% at 1 in 30 year risk)[205] and is partially within Zone 3. Other Opportunity Areas also have smaller areas in Flood Zones 2 or 3. Apart from Earls Court and West Kensington, none of the West London OAs are within this flood risk level (15%+ of the area for 1 in 30 year event). The next level of flood risk (10-15% for a 1 in 30 year event) does not apply to any of the West London OAs, but Colindale/ Burnt Oak, Great West Corridor, Harrow and Wealdstone, Old Oak Common and White City fall in the 5-10% level.

The London RFRA sets out the flood risks for each Opportunity Area, as presented below, covering river/tidal and surface water:

Table 4-11 - Opportunity Area flood risk

Opportunity Area	Flood risk character (SW – surface water)	Potential mitigations	Area % at 1 in 100yr // 1 in 30yr risk
Colindale/ Burnt Oak	**Part of area within Flood Zones 2 and 3**. Silk Stream, a River Brent tributary runs through, where localised flooding has been recorded. SW - Some surface water flood risk areas along tributary river corridors, especially near Burnt Oak LU Station	• Set development back from river's edge. • Investigate opportunities to reduce flood risk impacts from climate change on the Silk Stream. • SW - New development opportunity to introduce more sustainable rainwater management – able to achieve substantial reduction in run-off rates	**14%** **8%**
Brent Cross/ Cricklewood	**Small area within Flood Zones 2 and 3** with some local flood history on the River Brent. SW - There are some surface water flood risk areas with recently recorded	• Set development back from river's edge. • Investigate opportunities to reduce flood risk from River Brent, including	**6%** **4%**

[202] *Inclusive Growth Strategy,* LB Brent (2019)
[203] *North Brent and Harrow Catchment Study*, produced by Thames Water, with Environment Agency and the LB Harrow and LB Brent (2018)
[204] *London Regional Flood Risk Appraisal* 2018, GLA and Environment Agency (2018)
[205] ibid

	flooding history, particularly along the River Brent corridor, the A406 passing under the A41, the A41 south of the A406, Cricklewood Lane near Cricklewood Station and around Prayle Grove.	climate change impacts. Opportunities to restore canalised/culverted watercourses. • SW - New development opportunity to introduce more sustainable rainwater management – able to achieve substantial greenfield run-off rates	
Earls Court and West Kensington	**Partially within Flood Zone 3** and with a high level of protection with raised river walls. SW - Documented surface water/sewer flood risk areas and capacity issues in the Counters Creek catchment, affecting properties. London Overground and Underground rail lines at risk and areas close to large footprint buildings. Many older properties in the area have basements which will be at a higher risk of overflow from the highway network.	• Located in the Hammersmith TE2100 policy unit. • SW - Consider the role of multipurpose open spaces for flood risk management and management of surface water. • SW - opportunity to introduce more sustainable rainwater management and achieve a substantial reduction in run-off rates, as has been achieved at Westfield with substantial rainwater storage.	**18%** **17%**
Great West Corridor	**Mainly Flood Zone 1** although eastern parts include Flood Zone 3 from tidal Thames and River Brent floodplains. SW - Some areas have significant surface water flood risks, mainly to the south of Great West Road.	• Set development back from river's edge and deliver TE2100 recommendations. • Investigate opportunities to reduce flood risk from River Brent, including from climate change. • SW - opportunity to introduce more sustainable rainwater management - should readily be able to achieve a substantial reduction in run-off rates.	**15%** **9%**
Harrow and Wealdstone	**Some areas in Flood Zone 3** of the Wealdstone Brook floodplain. The Brook flows through the site in culvert. SW – risks particularly to the highway network, including low lying parts of the High St, Masons Ave and around Kenmore Ave. The combination of surface water, sewer and fluvial flooding are of concern.	• Set development back from culverts and seek opportunities to open up culverted sections of the river. • Look at opportunities to reduce flood risk for the Wealdstone Brook, including climate change impacts. • SW - opportunity to introduce more sustainable rainwater management - should readily be able to achieve a greenfield run-off rates and reduce the current risks in the area and downstream.	**11%** **6%**
Hayes HZ	**Mainly Flood Zone 1**. Some areas have significant surface water flood risks, mainly around Hayes Town Centre.	• SW - Opportunity to introduce more sustainable rainwater management to achieve a substantial reduction on run-off rates.	**3%** **1%**
West of Hounslow and Heathrow	**Small proportion within Flood Zones 2 and 3**. Relatively minor surface water flood risks, although potentially risks to sub-surface roads/rail. Benefits from the presence of surface water balancing ponds.	• Set development back from river's edge. • Consider multipurpose open spaces for flood risk management, including climate change impacts, and management of surface water. • Opportunity to introduce more sustainable rainwater – able to achieve greenfield run-off rates.	**7%** **4%**
OOC / Park Royal	**OOC Wholly within Flood Zone 1.** Park Royal lies along the River Brent to the west of North Circular and **partly**	• Set development back from canal edge.	**7; 8%**

	within Flood Zones 2 and 3. Grand Union Canal runs through the site. The area drains to the already overloaded Counters Creek Catchment SW - generally localised and small risks for OOC, although some rail cuttings and road underpasses identified as at risk. For Park Royal, localised SW flood risks close to large footprint buildings, A406 underpasses and lower stretches of the rail network.	• SW - opportunity to introduce more sustainable rainwater management to achieve substantial reduction in run-off rates and discharge into the local combined sewer network. • Park Royal – opportunity to achieve greenfield run-offs rates. Sites close to canal could discharge here, alongside use of multipurpose open spaces and drainage for large roof areas.	**7%; 4%**
Southall	**Flood Zone 1** but close to floodplain of Yeading Brook. Grand Union Canal runs alongside the site. SW - Some localised surface water flood risks, mainly focused on the public highway network	• Set development back from canal edge. • SW - Opportunity to introduce more sustainable rainwater management – greenfield run-off rates. Sites close to canal to consider discharge here.	**5%** **1%**
Wembley	**Some areas within Flood Zones 2 and 3** of the Wealdstone Brook/River Brent, which flows through. SW - minor flood risks, focused on the Wealdstone Brook corridor and areas close to large footprint buildings.	• Investigate opportunities to reduce flood risk from River Brent, including climate change. Set development back from river's edge • SW - Opportunity to introduce more sustainable rainwater management - able to achieve greenfield run-off rates. Alongside multipurpose open spaces and additional drainage from large roof/hardstanding areas	**11%** **4%**
White City	**Small area within Flood Zone 3** and with a protection from river walls and the Thames Barrier. SW - some significant risk areas, with drains to the already overloaded Counters Creek Catchment	Located partially within Hammersmith TE2100 policy unit. SW - opportunity to introduce more sustainable rainwater management to achieve substantial reduction in current run-off rates and reduce discharge rates into the local combined sewer system, as has been achieved at Westfield with rainwater storage. Also consider role of multipurpose open spaces and additional drainage for large roof/hardstanding areas.	**10%** **7%**

Source: London Regional Flood Risk Appraisal 2018

Figure 4-12 provides a mapping of West London's flood zones and water bodies with the Opportunity Areas.

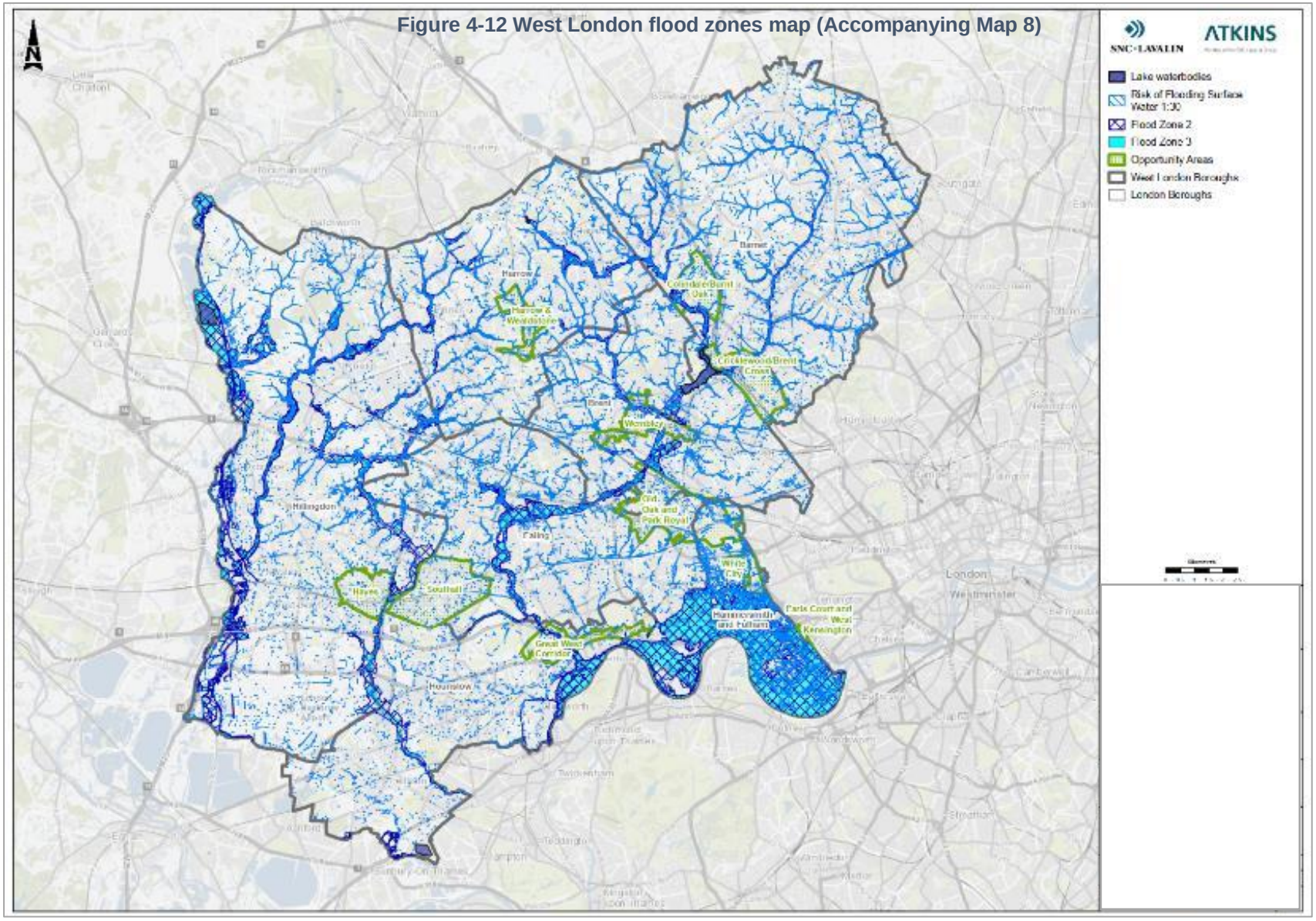


Figure 4-12 West London flood zones map (Accompanying Map 8)

There is a need to investigate opportunities to reduce flood risk from the Silk Stream Valley, River Brent, Grand Union Canal and Wealdstone Brook. At new developments there are opportunities to introduce sustainable rainwater management to reduce runoff and achieve greenfield runoff rates. Multipurpose open spaces and drainage attenuation from large roof/hardstanding areas are further mitigations to consider for some of the development sites.

The London RFRA also demonstrated the risk to strategic infrastructure assets, as summarised below:

- Land used for utilities is the strategic infrastructure most in areas of high flood risk (44% of 587 sites).
- 85 mainline stations and 87 km of mainline rail corridor at high risk of tidal/fluvial and/or surface water flooding. This represents 24% of London's stations and 11% of its rail corridor. A key issue is also the vulnerability of power supplies, signalling and communications equipment to flood risk.
- 4% of the London Underground and DLR stations and 9% per of the lines are at risk of tidal/fluvial and/or surface water flooding. The majority of high-risk stations are within the tidal Thames floodplain through central London and westwards
- 11% of the TLRN are at high risk, the majority of which is in the tidal floodplain, whilst there are numerous tunnels under the Thames. However, some important road sections including parts of the A13 and the North Circular are elevated.
- Heathrow Airport is largely free from flood risk, although some of the peripheral areas to the west of the airport could be affected by large floods on the River Colne system.

4.5.3. Planned strategic infrastructure

The West London SFRA has identified partnership working across West London to mitigate flood risk.

Cross-boundary working is also central to the All London Green Grid (ALGG) and its development going forward.

The Brent Catchment Partnership are undertaking projects to improve and enhance watercourses within the River Brent catchment. The potential projects include Silk Stream, Tokyngton Park, and Greenford Flood Alleviation Schemes to be delivered by Barnet, Brent, and Ealing respectively alongside the Environment Agency as part of their Brent 2100 strategy. The overall objective is to transform "up to 10 kilometres of heavily modified river to a more natural condition by 2021". These projects provide opportunities to safeguard land to achieve this objective.

The River Pinn and Cannon Brook Flood Alleviation Scheme is a partnership between Harrow, Hillingdon and the EA. The scheme aims to better understand flood risk in the River Pinn catchment and reduce future flood risk, which may include flood storage areas to help safeguard land for flood mitigation purposes.

4.5.3.1. Committed project developments

Aligned with the strategic objective to use SuDS within development to reduce runoff rates and utilise rainwater, boroughs have been guiding SuDS provision. For example, the Hillingdon SIP (2017) included SuDS to address risks at new properties alongside mitigation at the common in West Drayton. These new SuDS will be integrated with other projects such as transport works around Hayes, mitigating surface water risks. This was identified for 2020-30 at a total cost of £15.75m – considered to be funded by Environment Agency and developers.

As an example of cross-sectoral benefits realisation, Harrow have recently completed the Newton Park flood defence with river restoration and the construction of wetlands[206]. This provides integration between benefits including recreation, open space access and quality, biodiversity enhancement and flood risk mitigation.

Hammersmith and Fulham have set out flood-related conditions for development planning permissions, including SuDS, which details how surface water will be managed on-site, drainage strategies detailing any on and/or off-site drainage works, detailed foul and surface water drainage

[206] SIDP engagement: LB Harrow input (August 2020)

schemes for development in Flood Zone 1, and with no infiltration of surface water drainage into the ground[207].

The Environment Agency and the boroughs have set out projects for flood mitigation, where these are at inception, and include the following.

Figure 4-13 Planned flood risk management schemes

Scheme Area	Area	Timeline, stage	Estimated cost
The Greenway Flood Alleviation Scheme (FAS)	Barnet	Inception	Not available from EA
Flood alleviation schemes for catchments: Muswell Hill, Friern, Underhill, Longmore Avenue, Hadley, Bittacy Park	Barnet	Inception	Not available from EA
Woodcock Park Flood Alleviation scheme	Brent	Inception	Not available from EA
Earls Court flood measures	Hammersmith and Fulham	For new site masterplan	Not available
White City flood measures, including former BBC Television Centre	Hammersmith and Fulham	Inception	Not available
Roxbourne Stream and Yeading Brook East Flood Alleviation Scheme	Harrow	Inception	Not available from EA
Headstone Manor Flood Alleviation Scheme	Harrow	In construction, delivery 2021-	Not available
A40 Critical Infrastructure Flood Risk Management Strategy	Hillingdon	2021 Detailed plans for development, at inception	Not available
Hayes End and Kingshill Avenue Flood Alleviation Scheme	Hillingdon	2021 At inception	£30k
South Harefield, Critical Drainage Area 012	Hillingdon	2022 Detailed plans for development, at inception	Not available
Breakspear Road South and Copthall Farm Flood Alleviation Scheme	Hillingdon	2020-22 Detailed plans for development, at inception	£35k
Joel Street Ditch	Hillingdon	2020-22 Detailed plans for development, at inception	£130k
Hillingdon Smart Water Catchment Network	Hillingdon	Inception	Not available from EA
Hillingdon strategic SuDS Pilot	Hillingdon	Inception	Not available from EA
North-West Hounslow Flood Alleviation Project	Hounslow	Inception	Not available
Isleworth and Brentford End Flood Alleviation Project	Hounslow	Inception	Not available

[207] SIDP engagement: LB Hammersmith and Fulham input (November 2020) – for Fulham Gasworks King's Park Road, Former BBC Television Centre Wood Lane and White City

Scheme Area	Area	Timeline, stage	Estimated cost
The Common, West Drayton, mitigate flood risk	Hillingdon	2021-	Hillingdon SIP 2017 EA, RFCC, HE
Crane Tidal Gate Replacement, near Isleworth	Hounslow	Inception, Environment Agency led	Not available
Feltham Flood Alleviation Project	Hounslow	Inception	Not available
Chiswick and Grove Park Flood Alleviation Scheme	Hounslow	Inception	Not available

The strategic priorities and challenges identified for West London's flood as well as green infrastructure provision have informed the strategic needs identified. These complement the planned infrastructure highlighted in this section. There are important interactions to both water and green and blue infrastructure, with the green infrastructure baseline set out below in Section 4.6.

4.5.4. Strategic need

A more holistic approach to flood management is required to appropriately mitigate the impacts of future growth and ensure residential and commercial sites and infrastructure assets are resilient. For example, the consideration of SuDS introduction with transport schemes through Highways England and TfL and with developments (e.g. rain gardens, green roofs) through developer requirements.

The Environment Agency are undertaking modelling updates for the River Crane and Upper Colne to better understand levels of fluvial flood risk in these catchments[208]. The emerging Colne 2100 strategy, which is at a very early stage, will aim to create a sustainable catchment-based programme of capital works for the whole Colne catchment enabling more integrated benefits, partnership working and potential for wider funding opportunities.

Maintaining flood risk at an acceptable level will require significant investment. Flooding has consequences for West London's infrastructure and its resilience, businesses and residents. Flood damage is a significant cost to individuals, landowners, infrastructure operators and businesses from climate change. The Climate Change Commission reported that annual damage to non-residential properties is about £800 million in the UK and this could rise to £1 billion by 2050[209], where small medium enterprises, contributing a significant share of employment, are likely to be less prepared.

Climate risk maps have been produced to analyse climate exposure and vulnerability across Greater London[210]. These maps can help the WLA, Boroughs and organisations deliver equitable responses to the impacts of climate change and target resources. Open spaces within development should be designed to accommodate flood waters, such as the Green Grid concept with small wetlands, ponds, diches, swales and woodlands to improve flood risk management. These also bring other benefits such as increased biodiversity, improved water quality, amenity and access to watercourses. There are clear integration opportunities with green infrastructure for flood management.

Flood defence asset renewal

A further need is in the long-term maintenance and renewal of flood defence assets. The Environment Agency have provided information here.

Flood defence replacement and upgrade – Environment Agency input[211]

There are a total of 92 assets that either need to be replaced or upgraded in West London. For security reasons the exact locations of these assets cannot be shared externally. The broad locations of assets rated as important replacements, those requiring significant fixes, cover:

[208] SIDP engagement: Environment Agency HNL Sustainable Places Team (October 2020)
[209] *Climate Change Risk Assessment – risks to business and industry*, Committee on Climate Change (2017)
[210] *Climate Risk Mapping*, Bloomberg Associates in collaboration with the Greater London Authority (2020). https://data.london.gov.uk/dataset/climate-risk-mapping
[211] SIDP engagement: Environment Agency HNL Sustainable Places (October 2020)

- North Feltham, Hounslow near Staines Road.
- South of West Bedfont, Hounslow near the A30.
- North of the M4 J3 in Hillingdon, near the A312.
- An area between the M4 and river Brent, with significant nearby green space and rail line within the Great West Corridor.
- An area where the A312 interacts with the Grand Union Canal and River Crane in Hillingdon.
- Locations around Boreham Wood to the North of Barnet.
- Assets between Edgware Way and the M1 and the A5 and Edgware underground station with the Dean's Brook, in Barnet.
- Assets to the east of the North Circular, toward Tokyngton and Wembley Park with interaction with the Jubilee Line and River Brent.
- Assets to the East of the M25 in the Colne Valley Regional Park.

These replacements and fixes have not been costed.

Further assets have been identified for less significant fixes and others where elements need to be inspected.

4.5.5. Identified needs and options

Flood infrastructure needs have been identified from a document review, through engagement including with the Environment Agency and as SIDP proposals in response to the challenges facing West London around strategic growth areas. This led to a long list of schemes, largely reflecting the project input from the Environment Agency. Table 4-12 presents a strategic view on this long list, focusing on the schemes that have a more direct impact on the strategic sites' delivery of housing growth. However, as has been recognised schemes beyond strategic growth areas are important as a part of holistic approach to understanding impacts of flood risk across areas and beyond watercourses.

Where timelines have not been specified from review or engagement, the SIDP West London development trajectory (Section 5.3) has been used to suggest a delivery timeline.

Table 4-12 Strategic Flood Management Infrastructure Needs

Proposal	Description	Suggested delivery	Cost est.	Strategic growth areas	Sources
Riverside flood defence	Flood walls investment – to be assessed to protect new wharf sites, maintenance to meet TE2100 requirements	Tbc longer-term	To be determined	Fulham Earls Court & West Kensington	H&F IDP, 2016 Environment Agency input
Barnet catchment Flood Alleviation Schemes	Decoy Brook critical drainage area 18; Mill Hill Circus flood storage area; Muswell Hill catchment Studies being undertaken before OBC stage	2021 onwards	To be determined	Brent Cross Mill Hill	EA SIDP input
Silk stream and Greenway	Colindale flood alleviation scheme	2023-	To be determined	Colindale/ Burnt Oak	EA SIDP input
Brent sewer network improvement	Sewerage network refurbishment, reduction of run-off from roads, roofs and parking areas	2021 onwards tbc	To be determined	North Brent	The North Brent & Harrow Catchment Study (2018)
Southall flood alleviation	Critical Drainage Area 5 – Southall, Yeading Lane – studies pre OBC Southall flood alleviation	2022 onwards	To be determined	Southall	EA SIDP input

Proposal	Description	Suggested delivery	Cost est.	Strategic growth areas	Sources
North Acton	North Acton Flood Alleviation Scheme	2024-30	To be determined	OOC/ Park Royal	EA SIDP input OPDC IDP 2021
Grand Canal SuDS	SuDS connected to Grand Union Canal; canal improvements for conveyance capacity	OPDC 0-10 years	To be determined	OOC/ Park Royal	OPDC IDP 2021
Stamford Brook reroute	Reroute of Stamford Brook Sewer along the north of the Canal in Old Oak North	2024-30	To be determined	OOC/ Park Royal	OPDC IDP 2021
Tokyngton and Stonebridge	Tokyngton and Stonebridge Flood Alleviation Scheme	OPDC 0-20 years	£4m	OOC/ Park Royal	OPDC IDP 2021
Wealdstone flood risk management	Wealdstone Brook Flood Alleviation Scheme. Transforming up to 10 kilometres of heavily modified river to a more natural condition by 2021, creating or improving 12 miles of riverside access for all Undergoing studies before OBC stage. Relates to foul sewer, fluvial and pluvial flooding. Partnership project with the EA & TW led by Harrow.	2022-	TW and TRFCC levy; tbc	Harrow & Wealdstone Wembley	River Brent Catchment Management Plan EA SIDP input
Storm relief sewer network, Counters Creek	Upgrade and connect sewer system through Counters Creek catchment as part of Flood Alleviation Scheme	2022-25	To be determined	White City	H&F SIDP input
Frogs Ditch and Cranford Park Flood Alleviation Scheme	Detailed plans due For development. EA: Studies pre OBC approval	2020-2025	£0.5m	Hayes	LB Hillingdon input, EA SIDP input
Critical Drainage Mitigation: Overground, Kew Bridge	Increase capacity, flood management This requires updated review	2022-28	£1-10m range	Great West Corridor	Draft Hounslow IDP 2020 as critical drainage mitigation for review
Critical Drainage – M4 Cranford and North Hyde	Increase capacity and implement flood plan	2022-30	£1-10m range	West of Hounslow	Draft Hounslow IDP 2020 as critical drainage mitigation for review
Strategic growth area SuDS	Strategic SuDS in developments and public open space to reduce runoff to roads and discharges to sewer system. Further use of green roofs, rainwater harvesting and permeable paving where suitable.	As per OA schedules	To be determined	Cross-OAs	SIDP basis

** These are being delivered by Harrow LLFA with the support of planning policy team to link capital investment to the Harrow Green Grid program, considering s106, CIL & BCIL partnership funding*

Schemes identified by the Environment Agency and Boroughs within a long-list that relate to further growth areas include:

- Pinner and Hatch End Flood Alleviation scheme, in advance of the OBC approval, in North Harrow
- Greenhill, in advance of OBC approval, for Harrow Town Centre
- Critical drainage areas in Ealing including Northolt – at detailed design phase

- West Ealing, with Greenford flood management schemes, with wetland creation or enhancements along Coston's Brook, and Pitshanger flood alleviation. Studies being undertaken in advance of an OBC
- Hounslow Town Centre flood alleviation scheme, with studies in advance of an OBC and a cost

Section 5.2 provides the categorisation of these flood management needs, considering where identified schemes most interact with strategic growth areas, green infrastructure and transport schemes as a focussed set of needs from this long-list.

4.6. Green-Blue Infrastructure

The provision of green and blue infrastructure in and around urban areas supports quality of place and supports the experience of residents, visitors and business, encouraging investment, alongside improvements to the environment. Green infrastructure is not always considered infrastructure in its own right and its cross-sectoral benefits are not always realised, supporting the need for cross-boundary and regional approaches to its provision and access. Green infrastructure's offer is cross-sectoral in supporting water quality, flood mitigation, sustainable drainage, active travel modes, air quality, biodiversity, energy efficiency, urban cooling and shading, healthy living and social cohesion. As such, its cross cutting issues should be considered with water, waste, energy, transport and climate change adaptation and it is this cross-cutting aspect of Green infrastructure that is deemed strategic for the purposes of the SIDP.

As population grows there is a need to increase the functionality of the existing network and improve linkages and its overall performance. This can lead to cost effective provision by also addressing flooding and air quality in realising synergies between infrastructure provision.

For the purpose of strategic need assessment, the SIDP focusses on public open space that is at local park category (2ha or more) or higher (district, metropolitan and regional parks), as well as West London's most significant waterways. It is recognised that there are smaller open spaces, private access and other green features that are highly valuable and protected in providing a range of benefits as part of the wider network of green infrastructure.

Further, the provision of SuDs and water re-use infrastructure for the strategic growth areas have been captured under the water and flood management sectors.

4.6.1. Strategic policy priorities

The National Policy Planning Framework states that LPAs should set out a strategic approach in local plans to plan positively for the creation, protection, enhancement and management of green infrastructure and biodiversity networks (paragraph 114). Local plans should also include policies which plan for biodiversity at a landscape scale across local authority boundaries; identify and map local ecological networks including the hierarchy of designated "sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation." (paragraph 117).

4.6.1.1.1. London

London is one of the greenest big cities in the world, as protected by the land use planning framework. The London Plan gives continued protection to Green Belt, Metropolitan Open land and publicly accessed open space. The Mayor has set a target for at least 50% of London to be green by 2050, as a National Park City.

As part of the London Infrastructure Plan 2050[212] the strategic objective for London to have a city wide green infrastructure network that is planned, designed and managed to absorb floodwater, keep the city cool, encourage healthy lifestyles, and enhance biodiversity and ecological resilience. This forms part of the 2050 Enabling Infrastructure Report objective, alongside London having a secure, sustainable and affordable water and energy supply; have transitioned to a circular economy; and be resilient to all but the most extreme weather.

The London Plan Policy G1 states that development plans should use evidence, including green infrastructure strategies, to:

- identify key green infrastructure assets, their function and their potential function; and
- identify opportunities for addressing environmental and social challenges through strategic green infrastructure interventions.

Proposals should also incorporate appropriate elements of green infrastructure that are integrated into London's wider green infrastructure network.

The economic and social value of Green Infrastructure should also be recognised (such as Natural Capital accounting approaches) as an integral element rather than additional elements to development.

[212] London Infrastructure Plan 2050, GLA (2016)

In terms of open space, development plans should undertake a needs assessment for public open space deficiencies and consider the quality, quantity and accessibility of open space. The improvement of open space can include improved public access, inclusive design, recreational facilities, habitat creation, landscaping or sustainable urban drainage systems (SuDS).

Development should contribute to the Mayor's 50% green target by including urban greening, including street trees, green roofs, green walls, and rain gardens and major applications are subject to Urban Greening Factors. Across the boroughs, it is recommended that all households live within 400m from the nearest green space of over 2ha.

4.6.1.2. London's green grid

The All London Green Grid (ALGG) is a city-wide scheme to create (and protect) green corridors between the capital's open spaces for people and wildlife. The ALGG creates opportunities for people to travel safely between the capital's parks, nature reserves and waterways; the objective being to create a network of corridors and links that join many of these places together.

With green infrastructure working as a network of assets, it is best considered above the local level, supporting connections and synergies, where challenges and opportunities may be more apparent at a sub-regional level. This is reflected with the ALGG action areas.

The Mayor has set up a Green Infrastructure Taskforce, which has published a report of recommendations including changes to valuation, governance and funding[213].

It is recognised that no single organisation or set of organisations manage London's green space from a network perspective. The boroughs and the Royal Parks manage many public parks and open spaces, alongside a variety of other organisations that manage or contribute to other spaces. This presents a challenge where the capacity of green space to reduce flood risk is not always factored into their planning or design and synergies with other sectors. Furthermore, there are important synergies with other infrastructure needs and it is expected that actors in these sectors will contribute to the cost of establishing more coherent green infrastructure[214].

4.6.2. Current provision and challenges

In terms of current provision and direction, the following sets out borough level green infrastructure, before a consideration of the cross-boundary provision and ALGG, and recent developments.

4.6.2.1. Borough provision overview

Barnet

Barnet is one of London's greenest boroughs, with a Green Infrastructure network that is significant at both the borough and sub-regional scale. 28% of land is dedicated Green Belt and 8% is designated Metropolitan Open Land[215]. The south of the borough includes the Welsh Harp Reservoir SSSI; 8 Sites of Metropolitan Importance; 10 Sites of Borough Importance (Grade I) and 25 Sites of Borough Importance (Grade II). The Welsh Harp, together with the River Brent, Silk Stream and Pymmes Brook, form part of the Blue Ribbon Network for London that has policy recognition within the London Plan[216]. Barnet has a total of 73 public parks and commons accessible to the public ranging in size from a 0.04ha playground up to the 74ha Monken Hadley Common. The Barnet Core Strategy set out areas deficient in public space. This has been used to identify a need to create new parks to address deficiencies and support quality and identify of place for these areas.

Brent

Fryent Country Park (103 ha) is one of the largest green spaces in Brent alongside the Brent Reservoir, of which around 50ha is in Brent. The Grand Union Canal through Brent (12 ha) is another key asset. Overall, Brent has 4,300 ha of green spaces and 600 ha of parks areas, which equates to 14% of the borough and is lower than the Greater London green area average of 20%[217]. Many households are beyond the London Plan recommendation for households to be a maximum of 400m from the nearest significant green space (2ha). Brent has found this to be over 50% of households

[213] *Natural Capital: Investing in Green Infrastructure for London*, GI Taskforce (2015)
[214] '*Enabling infrastructure: Green, Energy, Water and Waste to 2050',* GLA (2018)
[215] *Watling Chase Community Forest Plan (WCCFP)*
[216] *Green Infrastructure Supplementary Planning Document*, LB Barnet (2017)
[217] *Inclusive Growth Strategy – Environment,* LB Brent (2019)

and has mapped these areas. This includes areas within the Wembley and OOC/Park Royal Opportunity Areas, whilst the larger green areas are clustered in the North of the Borough. Brent has stated their ambition to protect and increase green space.

Ealing

Ealing has good presence of larger green spaces and parks, with total green space covering 17% of the borough[218]. Notable assets include Horsenden Hill, Brent River Park, Northolt and Greenford Countryside Park, which are designated Green Belt or Metropolitan Open Land (MOL) areas, and Gunnersbury Park (managed with Hounslow) recognised in importance by English Heritage. Ealing is also served with blue ribbon asses including the Brent River Park, Grand Union Canal and River Crane.

Public space totals 634 hectares and community open space at 353 hectares of the total (near 1000ha), with restricted access. 2011 analysis showed Ealing with a borough average provision of 1.97ha /1000 people, though to 2025 this was estimated to decrease to 1.82ha with population growth. Whilst there are many large spaces, the distribution of green spaces mean some areas are not well served and do not have significant access within 400m. These include pockets in the South West such as Southall (two wards under 0.5ha/1000), centre of the borough (such as Ealing Broadway ward), and the east of the borough as the most urban area has a lack of public space and district parks such as Acton wards with below 1ha/1000[219].

Hammersmith and Fulham

Hammersmith and Fulham has a total 386 ha of open space, 231 ha of which is publicly accessible with green amenity representing a significant share of the total such as housing greenspace[220]. Across the borough there is 1.3ha/1000 people of open space provision, which is below the National Playing Field standard of 1.6 and where many residents do not have convenient access to local parks[221]. This deficiency will further increase with population growth if additional open space is not provided with development. There are current deficiencies of open space reflecting the built up nature of the borough, including to the north of the Westway along Du Cane Road, in the centre of Brackenbury Village and the area of Fulham bounded by Filmer Road, Dawes Road and Fulham Road. There are also pockets of deficiency including the North Fulham estates near Earls Court, the riverside regeneration area, Hammersmith Town Centre and in parts of the White City Opportunity Area. Regeneration areas are deemed to key to provide new space to address increasing deficiencies with population growth.

Harrow

Harrow has a strong provision of green space along the North of the borough as areas of accessible Green Belt. The rivers of Brent, Colne and Crane all pass through the borough. Harrow identified a strategic aim to promote its profile as a Green Belt borough. Some built up areas of the borough are though deficient in public park/open space provision with pockets across the West, Central and East of the borough below its northern band, including the Harrow and Wealdstone Opportunity Area. Harrow recognised that its green space did not 'read' as a network and established a Green Grid programme in 2011 to map spaces and set out projects to meet objectives[222]. These include the provision, quality and realisation of benefits including flood risk, urban heat and heritage offers and connectivity, where a linked green grid can support strategic walking and cycling routes.

Hillingdon

Hillingdon has large areas of Green Belt land, and regionally important spaces including the Colne Valley. As a whole, the borough has 3,409 ha of open space, 55% of which is natural and semi-natural green space as woodland, grassland and wetland. Green corridors with river valleys and the Grand Union Canal (20 miles) provide important links between spaces and cover 6% of the total[223]. Unrestricted access open space accounts for around just half of the total (1,758 ha). This reflected a Borough wide deficient of 0.13 ha per 1,000 people or 38.8 ha, at the time of the Open Space Strategy. For recreational open space, with a 1.72 ha per 1,000 population requirement, there was a

[218] *Green Space Strategy 2012-17*, LB Ealing (2012)
[219] ibid
[220] *Infrastructure Delivery Plan*, LB Hammersmith and Fulham (2016)
[221] *Local Plan*, LB hammersmith and Fulham (2018)
[222] *Harrow Green Grid report*, LB Harrow (2012)
[223] *Strategic Infrastructure Plan*, LB Hillingdon (2017)

deficit of 0.28 ha per 1,000 people, or 84.9ha, compared to the proposed standards (2ha/ 1,000)[224]. Over 7% of the borough has no access to open space within 400m, areas beyond the Green Belt that lack access include Townfield, Uxbridge North, Eastcote & Ruislip and Northwood Wards. For access to district and higher level parks, deficient areas include those that form a band running from Uxbridge South and Brunel Wards south into Yiewsley, West Drayton and Heathrow Villages (wards) with a 'spur' running into Barnhill and Charville Wards. Considering population growth to 2026, a resulting deficit of 18.92 ha is estimated using the current standards (1.72), 11.5 ha of which would be located within the Hayes[225]. The presence of Heathrow drives a need for high quality provision, which would need to be protected and enhanced through the Heathrow Opportunity Area.

Hounslow

The borough has large areas of open space and a strong heritage, with historic estates at Chiswick, Osterley, Syon, Boston Manor and Gunnersbury retaining their houses and parkland. There are also significant waterways including the River Crane corridor which links spaces to the Thames Path, the River Brent and Grand Union Canal. The borough's Green Belt land and Metropolitan Open Land includes the Crane Corridor and large parks such as Hanworth Park and Hounslow Heath. In addition, the Royal Botanic Gardens at Kew, a site of international importance, lies adjacent to Hounslow's south-eastern border. The Thames flows alongside the borough and is criss-crossed by smaller waterways such as the Crane, Longford, and Duke of Northumberland's Rivers[226]. Open space covers 37% of the borough at 720 ha, above the London average. However, 5 wards in particular have deficiencies with 40% of households lacking access[227]. The presence of Heathrow drives a need for high quality provision, as supported with the Colne & Crane Valleys Green Infrastructure Strategy and the All London Green Grid area opportunities (Table 4-13).

4.6.2.2. Cross-boundary provision

The ALGG will be reviewed and updated in its guidance for the strategic green infrastructure network, where this provides a sub-regional approach to current provision, improvements and opportunities for extending green corridors and provision across London.

The GLA's 2012 supplementary planning guidance on the Green Grid set out 11 area frameworks for green infrastructure delivery at the sub-regional level. These areas interact within West London and the relevant areas are summarised below with green infrastructure assets including waterways which do, and can better, support a network.

Table 4-13 - London All Green Grid areas and opportunities

Area and West London boroughs	Notable Assets	Relevant Opportunities
River Colne and Crane Valley Green Grid – Ealing, Hillingdon, Harrow, Hounslow including Heathrow	Two areas are linked as a West London 'green web' with woodland, rivers, canals, lakes and parks. Colne Valley Regional Park, Ruislip woods, Grand Union Canal links, Uxbridge common and various country parks. Crane valley from north harrow and through Hayes, passes the east of Heathrow. Hounslow Common and Cranford Park as well as the London Loop walk.	A metropolitan scale park to the South West of the Thames 'Country gateways' as green visitor hubs Improving access to river and canals and integrate with walking and cycling routes
Brent Valley and Barnet Plateau – Barnet, Brent, Harrow, Hounslow, Ealing	Contains large open spaces in the Green Belt with large value and potential enhancements, whilst the urban edge has some green space deficiencies	Improve walkways and river such as parts of River Brent, with a Brent River Greenway which would cover Wembley and Brent Cross/ Cricklewood, A Brent Valley Regional Park

[224] *Hillingdon Open Space Strategy 2011-26*, LB Hillingdon (2011)
[225] *Strategic Infrastructure Plan*, LB Hillingdon (2017)
[226] *Local Implementation Plan 3,* LB Hounslow (2019)
[227] *Hounslow draft Infrastructure Development Plan,* LB Hounslow (2019)

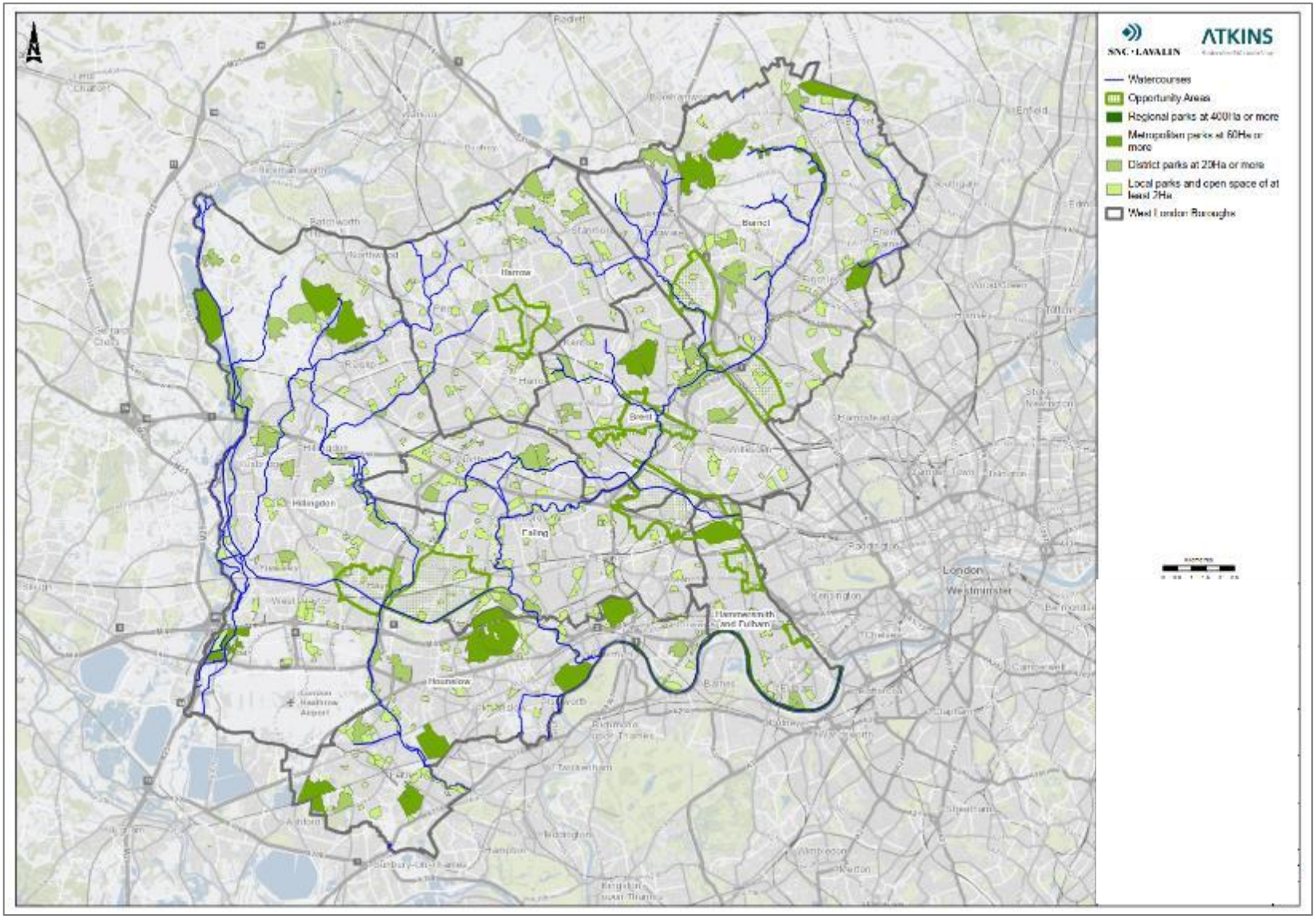
	Silk Stream valley Welsh Harp, Dollis Valley Greenwalk, Osterley Park, Gunnersbury Park	Improve links between spaces and destinations through Harrow and Wealdstone, Park Royal.
Lea Valley and Finchley Ridge – Barnet	Finsbury Park, the Parkland Walk link and Lee Valley	A regional park across North-East Barnet Area connections Improve facilities such as Trent Country Park
Arcadian Thames – Hounslow	Linkages between the Thames with the National Trail, high quality open spaces in the South West with corridors including the Crane and Brent River Valleys. Hounslow Heath, Crane Park, Osterley Park.	Interconnected networks, cycling and river crossings.
Central London – Hammersmith and Fulham	Fulham link with urban areas to the Thames covering Earls Court	Mitigate surface water risk Create linear parkway through Wormwood Scrubs and Earls Court's Counter Creek Green gateways along the A4 and A40 with waking and cycling environments and new public space integrated with the Elizabeth Line and Thames Tideway Tunnel

Source: All London Green Grid Supplementary Planning Guidance (2012)

The ALGG and its identified opportunities support the determination of strategic Green Infrastructure needs for West London, alongside current areas of deficiencies.

The following map shows the location of West London's strategic public open spaces by category – regional park (400ha or more), metropolitan park (60ha or more), district park (20ha or more), and local park and small open spaces (at 2ha or more) – as well as West London's watercourses. Smaller public open spaces provide value beyond those mapped, as part of the network of green infrastructure and provide a range of benefits.

Figure 4-14 Current Green Infrastructure strategic assets and watercourses (Accompanying Map 5)



The existing provision can be analysed in its corridor and asset interaction and distance to residents across West London, and with the Opportunity Areas, to determine areas of deficiency as presented further below.

Covid-19 impacts and future resilience

The Covid-19 pandemic and resulting lockdown measures has emphasised the importance of household access to green space. This has been especially true in areas where many households lack a garden or outside space, where a lack of access is detrimental to wellbeing and can compound socio-economic disparities alongside factors such as crowded housing and poor local facilities. ONS analysis[228] found 21% of households in London do not have access to a private garden and this rises for people of black and minority ethnicity. For the West London boroughs this data highlights that between 23% and 37% of flats do not have private outdoor space (averaging 32%) and across other property types this is 12-19%.

ONS data has also highlighted that the larger parks of London serve many times more people than the national average of 2,000 people, raising the concern not only of distance to green spaces but also the capacity of these spaces.

Green infrastructure has provided an important role in the ability of people to walk and cycle during this time, alongside the emerging streetscape and temporary cycle route provisions by TfL and boroughs. This has been critical to support: key worker access to employment sites; support social distancing; the local delivery of key goods; and residents' continued realisation of recreation and leisure benefits both as a safe walking and cycling and as an alternative where leisure sites have been closed.

The future role of green infrastructure in reducing congestion and overcrowding on transport routes, alongside air quality and health benefits, is especially so for journeys less than 5miles for those who live and work within West London. The indicative scale of employment growth to 2040 in West London provides a strong driver for the provision of appealing active mode access between residential and employment areas. Areas of low PTAL can benefit from increased connectivity through station access with cycling facilities and pleasant and safe walking and cycling routes supported by green infrastructure.

4.6.3. Planned and proposed strategic infrastructure

4.6.3.1. Committed project developments

There have been some recent green infrastructure additions and enhancements within the boroughs, which include the following deemed to be more strategic in nature:

Improvement programmes in Silkstream Valley Park, Montrose Playing Fields and Rushgrove park

This improvement includes park regeneration as well as flood mitigation works. This was part of the River Brent Catchment Management Plan and supports Green Infrastructure provision about the Colindale/ Burnt Oak and Brent Cross/ Cricklewood Opportunity Areas and for residents in Barnet and Brent. The first sections of this have opened as part of a £5m upgrade of the green spaces. This includes:

- A new wetland area in Silkstream Park that will fill with water whenever the Silk Stream Brook bursts its banks and therefore reduces the risk of flooding to nearby properties
- A bridge across the wetland area will allow residents to access the area and its wildlife
- New playgrounds and a hub café with various facilities

This funding was met mainly with developer contributions, alongside funds from the Mayor of London's Green Capital grant, the Environment Agency Water Environment Improvement Fund, and from the London Marathon Trust.

Further work is proposed as part of the Silkstream Valley with flood mitigation, transformative upgrades of open spaces and with underused parks beginning to provide a joined-up high quality green link along the entire length of the Silk Stream corridor to West Hendon[229].

[228] ONS Access to Green Space, April 2020 release; *Green Space Inequality*, Inter-generational Foundation IFG) article May 2020

[229] *Barnet Growth Strategy 2019-30*, LB Barnet (2019)

Thames Path Extension within Hammersmith and Fulham

The river walk for Queens Wharf including Riverside studios has been completed with open space access. Open space development at the Imperial Gasworks site is not yet complete but is part of the green space is now open access.

Hammersmith and Fulham committed plans

Kings Road Park of 6.7 Ha will be delivered in two phases, as a Southern Phase for completion 2022 and a Northern Phase for completion for 2027.

The White City Opportunity Area has a committed network of green corridors and public open space including a centrally located local park of approximately 2 Ha. In advance of this, the applicant sustainability statements have included commitments of public open and amenity space, green and brown roofs and ecological corridors around Westfield Shopping Centre and former BBC Television Centre.

Hillingdon open space improvement and target meeting

As identified in Hillingdon's Infrastructure Plan[230], the borough are ensuring the meeting of their 1.72ha/1,000 population target with an approximate 19ha of new open space provision across recreational and formal space, civic space, green corridors, outdoor sports, parks and gardens. This has been focused to meet needs from Hayes Opportunity Area and has been estimated at an approximate £1m cost. Further, the borough are working to improve the number of high quality open spaces, with new green flag designations at an estimated total cost of £2m.

As part of the Hayes development, mooring schemes and canal access are being provided by station road, at the Nestles site and West Drayton. A combination of Canal and River Trust and borough funding is also to be used to improve of the canal towpath between West Drayton and Uxbridge.

Gunnersbury Park improvements and sports Hub, Hounslow

As set out in the Hounslow IDP[231], Gunnersbury Park is undergoing major improvements alongside a development of a sports hub. This will be an important element within the Great West Corridor. These works have been funded by a council investment of £24m.

Dukes Meadow riverside park, sports and recreation improvements, Hounslow

Phase 1 started in 2019 to improve the 93ha riverside park with a reconnection to the Thames Path with a new tow bridge over the Thames and sports facility improvements. Walking and cycling routes to Hounslow growth areas will be an important element. The estimated cost is £10m[232].

The strategic priorities and identified challenges for West London's green infrastructure provision have informed the following identified strategic needs, with a focus on a network approach and with multiple cross-sector benefits to be realised.

4.6.4. Strategic need and opportunity

London's public parks are estimated to have a gross asset value of over £90 billion driven by their recreation, health and environment value. 61% of this economic value is attributed to increased residential property prices, 19% physical and mental health benefits, 19% recreational value, and 1% temperature regulation and carbon storage[233]. Further environmental value is driven with the aforementioned benefits (flood mitigation, urban cooling, air and water quality, emission absorption).

This value will increase with climate change impacts, bringing increased risk of extreme weather to London including heavy rainfall, heatwaves and water rising increasing flooding, water drought and risks to the resilience of infrastructure assets and networks. The GLA estimates that urban areas with high rise buildings and limited green space can experience an urban heat island effect of up to 10'C higher temperatures than other areas in London[234]. Climate risk maps produced by the GLA

[230] *Hillingdon Strategic Infrastructure Plan,* LB Hillingdon (2017)
[231] *Draft Infrastructure Delivery Plan,* LB Hounslow (2020)
[232] ibid
[233] *London Natural Capital Account*, GLA (2017)
[234] *London Environment Strategy*, GLA (2019)

demonstrate areas of climate exposure and vulnerability to heat and flooding[235] to help inform planning.

Green infrastructure is significant in addressing these risks, as well as enabling active mode travel to support wider decarbonisation. Further, the Covid-19 pandemic has emphasised the value and need for accessible green space for all residents.

The Mayor's target of 50% green cover by 2050 represents a challenge and a need for new approaches by West London boroughs where provision is below this level and where areas are a distance from significant accessible green space. Active mode provision can be supported with a network of accessible spaces and the overcoming of severance from road and railways. The Opportunity Areas and strategic growth sites provide a critical opportunity to make a step change through development plans and in ensuring new population areas have sufficient access.

This quantum of additional green space is unlikely to be met entirely through a traditional approach to provision. Consequently, in the existing densely developed parts of the city, and in those parts of the city identified for increased densification, the provision of green space may need to be met by alternative forms such as linked roof gardens or the greening of streets converted to shared space[236]. Such measures support the reduction of water into the sewer network helping to address areas of high sewer capacity utilisation and mitigate surface flooding risks (Sections 4.4 and 4.5).

4.6.4.1. Green space deficiency

The GLA Public Open Space Categorisation considers the size and distances from homes for assessing deficiencies across the open space hierarchy as:

- Regional Parks, of 400Ha and above – with a 3.2-8 km distance from homes
- Metropolitan Parks at 60Ha or more – with a maximum 3.2 km distance from homes
- District parks at 20ha or more - at 1.2km maximum distance
- Local parks and open space of at least 2ha – at a maximum 400m distance
- Small open spaces – less than 2ha and within 400m distance

This guides the strategic direction of green space provision and in considering the opportunities to integrate new and improved provision with significant development sites.

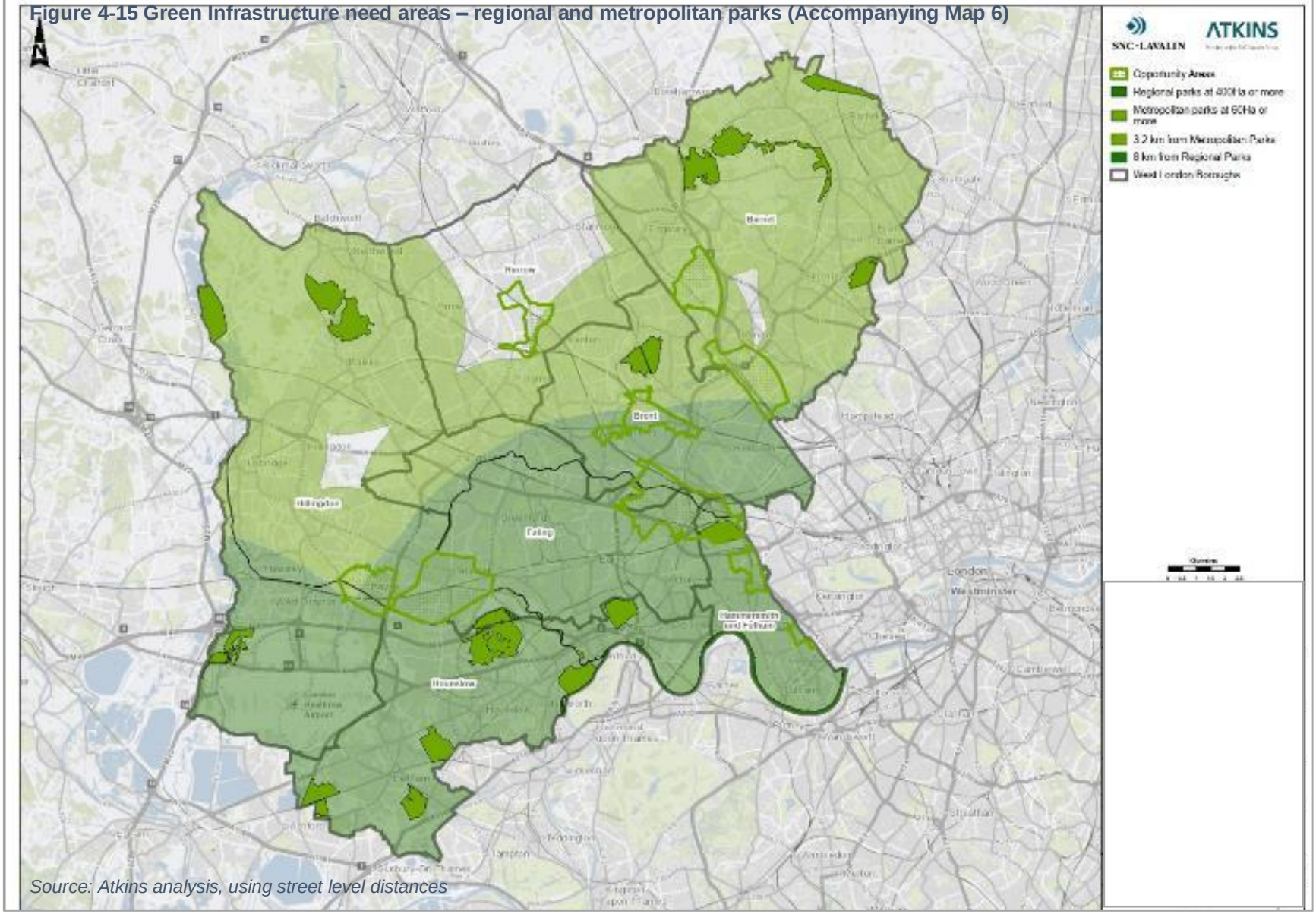
These categories with distance guidance have been analysed to determine areas of need across West London and in relation to the Opportunity Areas, as presented below in **Figure 4-15**.

Figure 4-16 below replicates a street level analysis for district and local parks.

[235] *Climate Risk Mapping*, Bloomberg Associates in collaboration with the Greater London Authority (2020). https://data.london.gov.uk/dataset/climate-risk-mapping

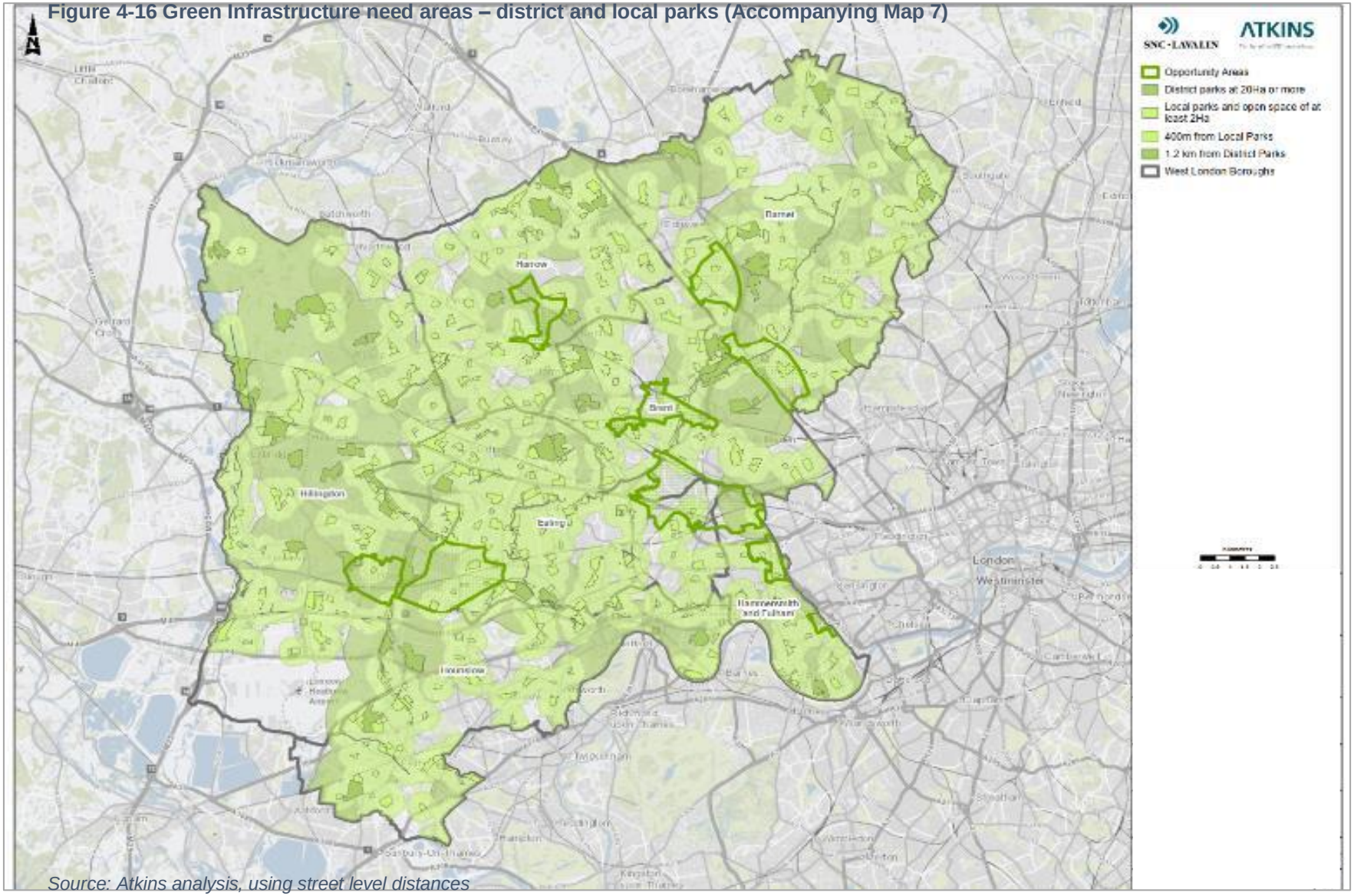
[236] '*Enabling infrastructure: Green, Energy, Water and Waste to 2050',* Mayor of London (2018)

Figure 4-15 Green Infrastructure need areas – regional and metropolitan parks (Accompanying Map 6)



Source: Atkins analysis, using street level distances

Figure 4-16 Green Infrastructure need areas – district and local parks (Accompanying Map 7)



Source: Atkins analysis, using street level distances

This analysis show areas of need for large scale open space access as:

- Central and north Harrow with a lack of access to regional and metropolitan parks, however there are parks that fall just below this categorisation with Stanmore Country Park and Bentley Priory[237];
- An area in central Hillingdon with a lack of access to regional and metropolitan parks;
- An area in Barnet, through Hendon up to the A1, with a lack of access to regional and metropolitan parks; and
- A lack of regional park access (within 8km) for over half of the West London area as that area North of the regional park shaded area. This area includes three full Opportunity Areas (Harrow and Wealdstone, Brent Cross/ Cricklewood, Colindale/ Burnt Oak) and part of two (OOC/ Park Royal and Hayes).

And areas of need for district and/or local scale open space access as:

- An area central through North Hounslow, in proximity to West of Hounslow and the Great West Corridor
- Central and East Ealing
- OOC/ Park Royal
- Central West Hammersmith
- North Barnet and around Edgware
- North Brent to the North of Wembley
- An area on the North boundary of Harrow and Hillingdon

The emerging strategic needs from this analysis identifies that a regional park (400Ha and above) would address lacking access in the identified Northern curve area of West London. Such regional scale provision should also be utilised to realise further benefits with:

- Provision of linkages to pedestrian and cycling networks;
- Provision of flooding mitigation for the local waterways, near roadsides and development sites;
- Provision of nature conservation areas; and
- Provision of signage, lighting and surface improvements with safe, inclusive and high quality access.

Regional park provision for West London is aspirational at present and would require extensive cross-boundary working and collaboration with relevant parties to test the concept. It would also likely require some land assembly. Further work is required to test the capability to bring forward such scale of green infrastructure development, in comparison to the provision of planned and further new blue-green infrastructure as part of a joined-up corridor across the north of West London. Overall, there is a continued need for increased provision of green infrastructure and green spaces and examining the case for a regional park is part of this.

Further, metropolitan park provisions (60Ha or above) would address deficiencies in Central Hillingdon and North Harrow.

In terms of district and local parks, areas which have been identified to have street distances above the guidance for both district and local open spaces should be recognised as priorities. There are instances where the designated Opportunity Areas could enable this access by including quality and accessible open space. This SIDP analysis recommends the following priorities for provision:

- Provision within OOC/ Park Royal to also serve the surrounding areas of need in Hammersmith and Fulham, Brent and Ealing – this would suitable be delivered through a Green Infrastructure network approach to ensure linkages to local assets including the canals;
- Provision to the West of Hounslow such as around Feltham to provide access to the area, as well as district level space to the West of the Great West Corridor;

[237] Bentley Priory is an area of 59.9Ha, and Stanmore Country Park totals just over 60Ha in summation of its different parts. These are covered in Figure 5-4 below.

- Provision to serve Edgware and North Barnet[238];
- Provision of a network approach to link assets across north Hillingdon and Harrow; and
- Provision of new open space and a network approach to serve North Brent south through Wembley and through to OOC/ Park Royal, which could link to future active travel routes

4.6.5. Identified needs and options

Documentation review and engagement with West London boroughs has identified Green Infrastructure schemes and proposals. Those that have been deemed strategic have been consolidated with the opportunities identified with the ALGG and with the needs identified from the SIDP analysis above. This has formed a set of strategic Green Infrastructure needs, which are presented below. Where timelines have not been specified from review or engagement, the SIDP West London development trajectory (Section 5.3) has been used to suggest a delivery timeline.

Further, the provision of SuDs and water re-use infrastructure for the strategic growth areas have been captured under the water and flood management sectors.

Table 4-14 Strategic Green Infrastructure Needs

Proposal	Description	Suggested delivery	Cost est.	Strategic growth areas	Specific cross-sector role	Source
1.Improve access within River Colne and Crane Valley Green Grid	Ensure better through access to river and canal along the green grid and to residential areas. Mitigate potential impact of HS2 route (Colne Valley Viaduct)	2025-35	To be determined	West of Hounslow Hayes Uxbridge	Integrate with walking and cycling routes	All London Green Grid Supplementary Planning Guidance (2012)
2.Brent River Park and Greenway	Brent River Park restoration south of Wembley Greenway links from with Alperton (meets Grand Union Canal), A406 corridor (address severance toward Stonebridge Park) and through to Brent Cross via Brent Reservoir SIDP recommends linkages to North of Wembley area as well	2022 onwards in phases	£2m base (Brent River Park) Developer, EA, Borough	Wembley and Alperton Brent Cross/ Cricklewood	Walking and cycle route (e.g. Wembley-Willesden, WLO stations and A406) Flood mitigation around Wealdstone Brook and River Brent	ALGG SPG Brent IDP 2019
3.North Harrow provision and linking green spaces to and through Harrow & Wealdstone	Connected green infrastructure to improve access where central and North Harrow has some deficiencies	2024 onwards	To be determined	Harrow and Wealdstone	Accessibility enhancements between spaces with cycling	ALGG SPG SIDP analysis
4.Green gateways along the A40 and A4; with new local parks at White City and Earls Court and	New public space integrated with the Elizabeth Line and Thames Tideway Tunnel. Green corridors and local park spaces of approx. 2ha at both areas	2022-30	a.£10m+	White City Earls Court & West Kensington Fulham	Corridor waking and cycling Surface water flood management	ALGG SPG Hammersmith & Fulham IDP 2016

[238] Barnet's Local Plan identified the need for 13 local parks where their location is to be determined for their delivery through to 2040, and with an estimated £20m investment need.

Proposal	Description	Suggested delivery	Cost est.	Strategic growth areas	Specific cross-sector role	Source
Fulham regeneration area					to reduce road runoffs	
5.Grand Union Canal towpath improvements	Utilise this asset to enhance benefits of connectivity between residential and employment areas	2021-35	£20m base estimate (Ealing sections)	OOC/ Park Royal Southall Hayes	Direct walking and cycling route with interaction to wider routes and spaces	Ealing SIDP input
6.Wormwood Scrubs enhancement	Support its role as district park, creating a linear parkway through to Earls Court's Counter Creek. Interaction with Grand Union Canal	2021-38	£15m+	OOC/ Park Royal White City	Counter Creek East-West Cycleway through OOC/Park Royal	OPDC, H&F masterplan in progress SIDP analysis
7.Brent Valley Park improvement and Brent River Walk through Greenford	Ongoing integrated green infrastructure & river restoration with habitat enhancements Opportunity to join Wormwood Scrubs via A40 green gateway (4,8)	2020-27	To be determined, a.£10m+	Southall Northolt	Flood mitigation for new development	River Brent Catchment Management Plan SIDP analysis
8.West of Hounslow development of new local parks and upgrade existing	As part of the Feltham masterplan, 6 parks for the town centre area are proposed. Upgrades to Bedfont Lakes, Hounslow Heath and Hanworth Park	2022-35	To be determined	West of Hounslow Heathrow area development and/or mitigation	To be combined with critical drainage needs identified for Feltham and flood alleviation scheme	Draft Hounslow IDP 2020 SIDP analysis
90. Great West Corridor green linkages	Improvements to Boston Manor Park and reduce M4 impact. Improve links for walkway and cycling through River Brent, local parks and to Ealing.	2022-30	To be determined	Great West Corridor	Flood mitigation for M4 and GWC	Hounslow SIDP input

Section 5.2 provides the categorisation of these green infrastructure needs, and Section 6 the delivery and funding approach.

4.7. Digital

Broadband and 5G have become a basic utility for residents and businesses. This is enhanced with emerging future working trends, patterns of consumption and leisure time and supporting growth sectors with green and knowledge intense businesses. Digital connectivity supports the productivity of existing businesses, the start-up and survival rate for new businesses, as well as efficiencies in public service provision.

Robust full fibre and 5G systems are a requirement for 'Smart City' technologies and will help future-proof West London's local places, with the facilitation of more efficient travel, consumption patterns, sustainability and climate change responses and quality of life improvements. Such interventions include:

- Internet of things – internet and data collection for the public realm, with monitoring and senor provisions for infrastructure usage and condition, with other examples including air quality.
- Smart power and water – with smart metering and flexible responses in generation and storage to peak activity and prices. This will help secure energy and water supply, efficiency of use and help the meeting of carbon targets.
- Demand management – such as with vehicle traffic, demand-responsive public transport, real-time urban space use and event management, providing time-savings, reduced congestion and pollution alongside quality of place improvements.
- Transport planning and improved logistics – with connected and autonomous vehicles (CAV), smart route planning and timing and efficient management of warehouse inventory and delivery.
- Big data use – software and transparent data that can be utilised for insights and real-time applications.
- Community engagement – real-time feedback and inclusive engagement from residents and businesses, as well as public services consultations such as in health and social care.

4.7.1. Strategic policy priorities

The Government has made commitment to full fibre for 15million properties by 2025 and coverage across all parts of the UK by 2033. For 5G, the Government has made commitment for the majority of the UK to be covered by 2027[239].

The Government has undertaken a technical consultation on proposed planning law changes for 5G deployment, particularly concerning environmental protection and to minimise the impact of deployment. The changes to the planning laws aim to make the UK's 5G rollout easier and faster, and include allowing:

- Mobile providers to put more equipment on masts, making it possible to share mobile masts and boost 5G coverage;
- New masts to be built taller to deliver better coverage;
- Existing phone masts to be strengthened to enable 5G;
- Building-based masts to be placed closer to highways to support coverage of road networks; and
- Cabinets containing radio equipment to be deployed alongside masts.

The Government's reform of the Electronic Communications Code (ECC) in 2017 aims to reduce rental costs to the telecoms sector, including local authority charges to access public assets, whilst ensuring that landowners receive fair payment. Further clarification regarding the Electronic Comminutions Code (EEC) has been provided by DCMS and MHCLG in a letter to councils in August 2020. The key messages for councils include:

- Local authorities play a critical role in delivering gigabit broadband, with the use of effective policies and procedures to engage with industry and support investment and roll out.

[239] *Future Telecoms Infrastructure Review,* DCMS (2018)

- The deployment of these networks is complex and requires strong collaboration not only between telecom operators, councils and third parties (such as contractors), but also internally within councils.
- To meet this challenge, all relevant teams (highways, planning, legal, estates and housing) should work towards an agreed goal: bringing digital connectivity, and with it faster economic growth and greater social inclusion, to local businesses and residents.

4.7.1.1. London

The 2017 Digital Connectivity in London report[240] revealed the city's economic productivity and international competitiveness at threat from its digital deficiency. London ranked 30th out of 63 cities across the UK for high speed broadband coverage. Across London there is a push to address this.

The London Plan (Policy SI_6) sets out digital requirements for development proposals to support London's future competitiveness by:

- ensuring that sufficient ducting space for full fibre connectivity infrastructure is provided to all end users within new developments, unless an affordable alternative 1GB/s-capable connection is made available to all end users;
- meeting expected demand for mobile connectivity generated by the development;
- taking appropriate measures to avoid reducing mobile connectivity in surrounding areas; where that is not possible, any potential reduction would require mitigation; and
- supporting the effective use of rooftops and the public realm (such as street furniture and bins) to accommodate well-designed and suitably located mobile digital infrastructure.

Development Plans should also support the delivery of full-fibre or equivalent digital infrastructure, with particular focus on areas with gaps in connectivity and barriers to digital access[241].

The Mayor launched the Smarter London Together Plan in 2018 as a roadmap to a world class smart city. It calls for the city's local authorities and public services to work and collaborate better with data and digital technologies. Five missions are presented: more user-designed services; a New Deal for city data; world class connectivity and smarter streets; digital leadership and skills; and the improvement of city-wide collaboration[242].

The Connected London Team at the GLA are supporting the improvement of digital connectivity in London. Coordination between boroughs and with providers is a key part of this, alongside the promotion of standardisation where possible, to enable investment into fibre and mobile infrastructure in underserved areas in London. The City of London Corporation developed a standardised wayleave template and the GLA has developed a Mobile Agreement Template for rooftops and greenfield to improve the process of agreement[243].

The Connected London team are working with TfL on the Connected London Full Fibre Network. This scheme will utilise TfL assets to deliver a full fibre backhaul network, connecting a significant distance of underground tunnels, roads and street furniture assets. TfL's roll-out of underground mobile services has meant hundreds of kilometres of fibre has been laid in tunnels, whilst TfL own surface assets such as lighting columns support last mile connectivity[244]. There is an opportunity for providers to be given access to TfL owned ducts to use these networks. Public sector property can also be made use of to make surrounding areas more commercially viable by funding connections[245].

[240] *Digital Connectivity in London*, Regeneration Committee (2017)
[241] *London Plan*, GLA (Dec 2019). Policy SI_6
[242] *Smarter London Together*, GLA (2018)
[243] *Enhancing Digital Connectivity: The role of operators and local authorities*, London First (2019)
[244] Connected London webpage, TfL. Accessed at: https://tfl.gov.uk/info-for/business-and-commercial/creating-a-connected-london?cid=telecoms
[245] *Connected London team webpage,* GLA. Accessed at: https://www.london.gov.uk/what-we-do/business-and-economy/supporting-londons-sectors/connectivity/digital; Connected London webpage, TfL. Accessed at: https://tfl.gov.uk/info-for/business-and-commercial/creating-a-connected-london?cid=telecoms

4.7.1.2. West London

The West London Alliance are working together to develop and implement a West London Digital Strategy with a principle of shared learning, engagement with providers, the collation and use of supporting data, common approaches to network access and the development of 5G use cases.

The WLA won a digital bid in 2019 for £11m to address broadband 'not spots' and to scale up skills and employment initiatives in West London. This includes working with GLA, TfL and the Concessionaire to deliver a £7m programme of new high-speed fibre networks in all seven boroughs, connecting public buildings to TfL stations. The WLA have also worked with TfL to link into their £150m installation of high-speed fibre along their rail network, to increase broadband speeds for large and small businesses and residents in inadequately connected areas. The WLA has committed to delivering a high speed broadband investment programme with TfL and the GLA[246].

Digital Strategies have been or are being developed by the boroughs, the SIDP has been informed by these[247]. Boroughs are undertaking a range of initiatives to improve digital connectivity and inclusion. The SIDP focuses on cross-borough perspectives at the sub-region level for digital.

West London Business and Capital West London have both raised digital connectivity as one of the top priorities of existing business and for potential inward investment[248].

For example, in Hammersmith and Fulham, digital Infrastructure underpins the economic, cultural and social infrastructures to develop places within the Borough, and the need for improved digital infrastructure is addressed in its Industrial Strategy. This includes actions on boosting enterprise, innovation, skills and infrastructure locally, based around a partnership with Imperial College in White City. It notes the need for superfast broadband to encourage businesses to start-up, adapt and grow, with the creation of jobs and apprentices. Hammersmith and Fulham's Digital Transformation projects fall under three separate agendas: (a) people; (b) place; and (c) innovation, and provide useful examples. The proposed projects are intended to achieve greater digital inclusion through initiatives such as new digital infrastructure and community facilities with high-speed connectivity and training for residents to increase digital skills. The Council are also pursuing with modern technology, such as electric vehicle charging points, working in collaboration with the London Office of Technology and Innovation.

As a strategic document the SIDP focuses on cross-borough perspectives at the sub-region level for digital, building on the work by boroughs like Hammersmith and Fulham. This allows for a more holistic and cohesive response to challenges and issues through initiatives like uniform procurement processes and greater information sharing, further cooperation for inter-borough issues such as congestion and data collection and through increased work with the West London Alliance.

4.7.2. Current provision and challenges

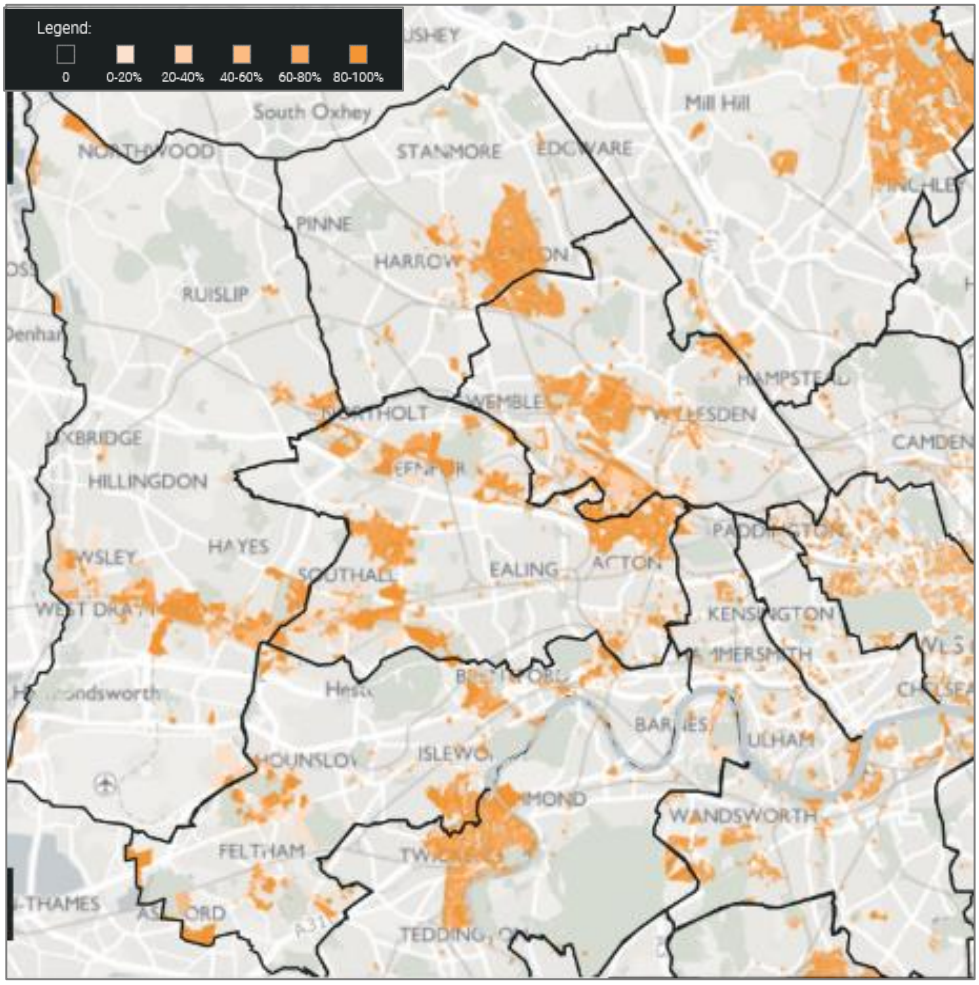
4.7.2.1. Digital connectivity

Around 10% of London had full fibre to the premises (FFTP) connection in 2019[249], and the latest Ofcom data shows a current London average of full fibre availability to be 15%[250]. London lags behind other global cities here[251] and this will impact competitiveness where it is not addressed.

For West London, that latest connectivity data shows where full fibre is available, where there is poor connectivity (lack of 30Mb/s availability, shown as % of premises) and where there are not-spots (postcodes with the highest number of premises with less than 30Mb/s availability). Figure 4-17 to Figure 4-19 below show these connectivity categories across West London.

[246] *Annual Report,* West London Alliance (2019)
[247] *Brent Digital Strategy*, LB Brent (2017); *Ealing Digital Strategy*, LB Ealing (2018); *Hounslow Digital Strategy*, LB Hounslow (2020)
[248] SIDP Engagement: West London Business and Capital West London (September 2020)
[249] *Fixed Broadband Network Availability 2019 H1*, ISP review (2019)
[250] *GLA London Connectivity Map, https://maps.london.gov.uk/connectivity (accessed October 2020)*
[251] *Cities of Opportunity 7,* PWC (2018)

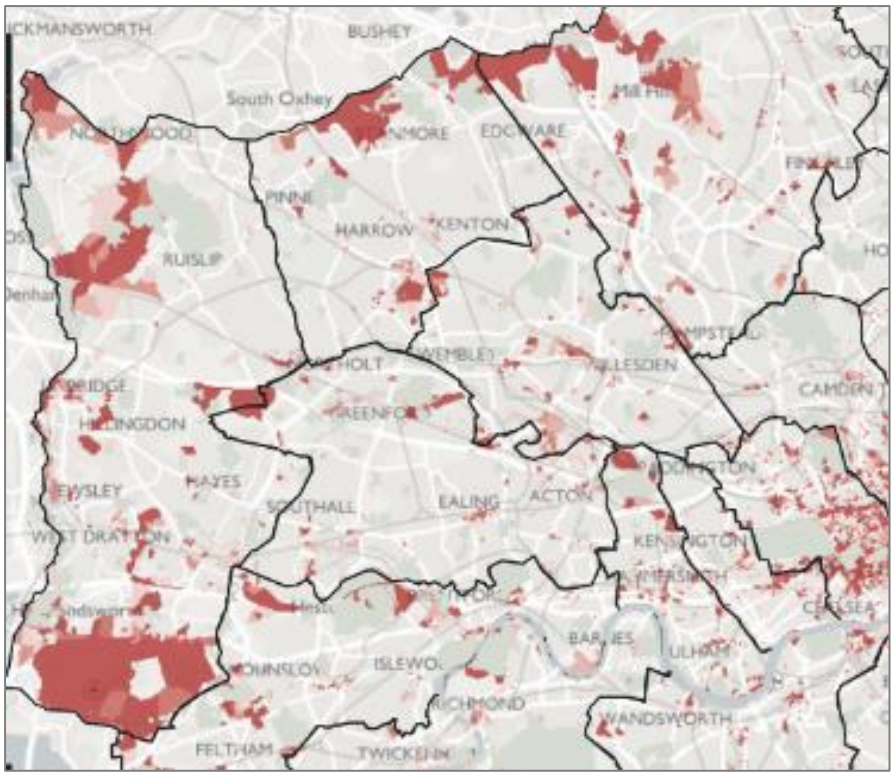
Figure 4-17 West London full fibre availability (2020)



Source: London Connectivity Map, Ofcom data (accessed October 2020)

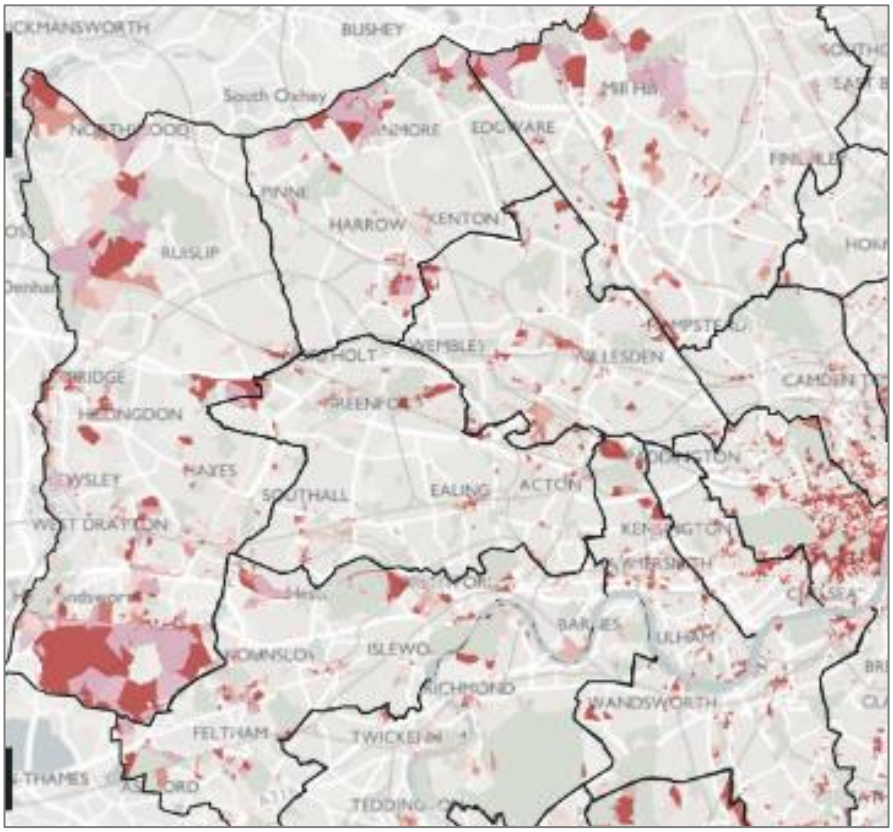
This shows some notable areas of full fibre availability with parts of Wealdstone, Wembley Opportunity Area, North Acton and along the Elizabeth Line Western section. There are areas with significant indicative growth that will require a step change in full fibre connectivity, with the A5 corridor from Brent Cross up to Edgware serving both Barnet and Brent; Southall; Old Oak Common; the Great West Corridor area and Hayes. This data does not show the exact locations of connections but rather the availability. Detailed Opportunity Area and site level assessment will be required.

Figure 4-18 West London non-availability of 30Mb/s (2020)



Source: London Connectivity Map, Ofcom data (October 2020)

Figure 4-19 West London 'not spots', overlaid onto non-availability of 30Mb/s (2020)



Source: London Connectivity Map, Ofcom data (accessed October 2020)

Not spot areas, and areas with a significant number of properties without 30Mb/s access are found within West London's outer peripheral areas in particular, and across some local centres including:

- Barnet: Edgware, Colindale
- Brent: pockets between Wembley and Willesden
- Ealing: Greenford and Northolt, pockets along Acton Main line/A402
- Hammersmith and Fulham: Parts of White City, Kensington, and central borough
- Harrow: parts of North Harrow, around Harrow on the Hill
- Hillingdon: West Ruislip, Harefield and Uxbridge
- Hounslow: Brentford and Feltham
- Parts of Old Oak and Park Royal

These mappings show the different quality of provision in areas of West London.

Covid-19 impacts and future resilience

The Covid-19 pandemic has raised demand for both high speed broadband and 5G as a significant proportion of people were required to work remotely across sectors, access and provide education from home, spend more of their leisure time at home and receive health and social service consultation. Business responses during Covid-19 have included local and small retailers and food & drink establishments making moves online to meet consumer demand and protect and build brand loyalty within the community.

Providers who were engaged with identified that their network was largely resilient, and shortages/ outages were avoided, whilst peak patterns of usage shifted to different times of the day. However, it was noted that in the years ahead there will be more smart devices that need to be connected, from individuals, premises and infrastructure networks.

Openreach, who provide much of the core network across West London, has seen an increase in traffic of 50-70% driven by home working, media streaming services and remote public service delivery[252].

Beyond Covid-19, the future of work and leisure time as a driver of economic change may be accelerated as home and flexible working and home-based service consumption is further tested and becomes embedded as new habits.

The roll out of full fibre and 5G is critical for business to be resilient, in building and responding to the changing demands of customers including goods and service delivery. Many employers are now engaging with staff on flexible and remote working and considering their future need for, and use of, more centralised employment space. This enhances the need for full fibre and 5G connectivity across residential areas and community hubs, to enable more remote working and office wireless speeds on the go. Further, the economic consequences of Covid-19 may drive an increase in the supply of home or local hub based self-employment, freelance and enterprise start-ups.

The uncertain nature of the pandemic in the UK and the emerging trends will require the needs to be revisited in the near future. Several technologies that are recognised as improving London's connectivity may become dated where their rollout is slow.

4.7.2.2. The market

There are several players in the fibre and mobile sector that currently provide and are interested in investing in West London. The WLA engaged with eight digital providers, with active investment programmes, during 2020, these are presented below in Table 4-15.

Table 4-15 - West London digital providers - WLA market engagement

Name	Markets
Hyper optic	Fibre networks and services – target markets residential and business

[252] WLA digital market engagement (2020)

Open reach	Fibre networks and services – target markets residential and business
BT	Mobile (EE) networks and telecoms services – target markets residential and business
Community Fibre	Fibre networks and services – target markets residential and business
Virgin Media	Fibre networks and services – target markets residential and business
ITS	Fibre networks and services – target markets residential and business
Freshwave (i-wireless)	Neutral Host Provider – builds telecoms infrastructure and leases capacity back to Mobile Network Operators.
Cellnex (previously Arqiva)	Neutral Host Provider – builds telecoms infrastructure and leases capacity back to Mobile Network Operators.

The engagement focussed on key areas relevant to the SIDP as:

1. Current network provision
2. Approach to infrastructure planning and response to growth
3. Committed investment plans for fibre and 5G
4. Barriers and best practice, considering planning and collaboration support for investment
5. Innovation and new business models, including accelerators and hubs, 5G use cases, neutral host models and small cells deployment

The key engagement insights on these areas are:

- Providers are relatively responsive to growth and are interested to expand their offering in West London and invest.
- Providers are more interested in some locations and types of provision in West London than others. These interest areas are driven by viability, for where likely level of demand is higher, with density (e.g. multiple dwelling housing blocks), ease of installation and supportive engagement and wayleaves with boroughs.
- There is an opportunity for investment to be unlocked through social housing fibre connections using master wayleaves, where this will support provider plans for a West London network.
- Access to the duct network, understanding capacity and where this can be expanded, is important, alongside the Physical Infrastructure Access (PIA) mechanism.
- A dig-once and all providers in the ground before paving are wide-spread principles, where collaboration across sectors and infrastructure asset owners is crucial here.
- Full fibre is critical to 5G provision and related solutions, where 5G alone does not have the bandwidth.
- 5G is deemed likely to be well focussed in town centres, whilst small cells and smart buildings also need full fibre.
- Full fibre need is also required with the increased demand through working from home trends.
- The providers typically work to 12-18 month plan horizons.
- The providers have interest and some experience in working with local authorities and industry to develop smart solutions and 5G use cases.
- Emerging models and best practice for future deployment should be utilised, including open access, small cells and neutral host models, with effective street asset policies.

- There are strategic cross-sector links emerging with the digital providers - Electric Vehicles, freight movements, energy provision and environmental monitoring, as well as in supporting relevant growth sectors.

The following provide further detail on these topics, before Section 4.7.2.3 presents the identified challenges and best practices for digital infrastructure.

4.7.2.2.1. Approach to infrastructure delivery

Viability and commercial approaches are important to understand, as well as the drivers for delivery that boroughs, developers and other stakeholders can influence.

Where sites are not currently commercially viable it is largely due to cost of delivery and/ or forecast income. Providers expressed a willingness to discuss proposals that improve these such as voucher schemes to contribute for each home passed to get a connection or with income certainty through service agreements for some premises for a period of time.

Developers have historically left provision to tenants but given long lead times providers can respond earlier and some expressed a willingness to respond to borough interest in such sites. Drivers for commercial site provision include heights, distance from assets, and whether the sites are out from town centres or provide other social uses. In the build to rent space, broadband provision is often included in the rent with other utilities.

4.7.2.2.2. New models and innovation in the market

It is recognised that West London has a significant population of technology companies, with aspirations across smart solutions impacting travel, public service delivery and business growth. New models and partnership approaches to deliver innovation can unlock use classes that can be defined at the West London level.

5G is mostly radio access at present and works on top of the 4G network. Investment in new assets is one preferred model to take forward, with small cells, macro sites and edge data centres. This relies on working with MNOs, building confidence and shaping investment cases.

Neutral host infrastructure comprises a single, shared network solution provided on an open access basis to all MNOs and is used to resolve poor wireless coverage and capacity inside large venues or other busy locations. They are usually deployed, maintained and operated by a third-party provider and are designed to support the full range of MNO technologies.

Openreach shared their alternative provision models, which allows them to reach areas before they would with a commercial approach, and included a ‘Fibre to the masses’ building programme; Community Fibre Partnerships, where they provide up to the commercial level and the community fill the gap through community/ Local Authority funds, such as high street not-spots; Universal Service Obligations for BT consumers where they do not fall under 12month plans; and the use of public sector anchors, such as libraries and community centres.

BT have innovative examples across place, monitoring and movement including electric vehicles, 5G connected ambulances and care home remote stethoscopes, air quality monitors, street furniture and big data use. BT identified that West London could respond to such opportunities in reinvigorating high streets, autonomous vehicles, logistics, monitoring and service provision, by engaging at the Openreach and EE level and responding and aligning to the EEC policy to create a positive market signal.

Community Fibre provide services for all public authorities to procure via the Network Services 2 framework. Councils and Housing Associations can buy ‘Built-In Broadband’ at wholesale rates via the G-Cloud Framework. This can provide free gigabit connection to borough community and health spaces and serve vulnerable communities.

Liberty Charge provide innovation development with the use of Virgin Media’s cable network, infrastructure and deployment experience, including borough transport and Electric Vehicles infrastructure and at same time provide fibre connectivity to provide efficiencies; and enhanced services with the use of cabinet assets for smart city solutions such as air quality readings, smart parking, smart roads and bin sensors. Liberty Charge are providing 200 Electric Vehicle charge points in Hammersmith and Fulham, 100 points in Hounslow and are in discussions with Brent. Their Electric

Vehicle plan is for over 10,000 points in London through the Charging Infrastructure Investment Fund (CIIF) and open access networks for residential charging scale deployment.

Freshwave identified the use of open access models to provide small cells and utilise street assets to improve speeds and offer coverage for social services including hospitals. An example is the City of London where Freshwave installed 200 cells through deign and collaboration with highways and planning teams.

ITS have identified Electric Vehicles and local public services as key areas for smart solutions over the next decade. They are considering neutral host models as a growth area to support MNOs and Smart City and IoT interventions.

Cellnex would approach smart city opportunities in West London, such as air quality monitoring, pedestrian and traffic movements, by looking at how they can expand their services or install the infrastructure with rooftops and street furniture. Electric Vehicles and virtual reality require high speeds and proximity. Cellnex identified the need to address the barrier of MNO confidence and to consider longer-term approaches to a West London strategy, where small cells can be part of this. Shared neutral host models are more economic though rely on MNOs giving up some access.

It was recognised that edge data centres have differing land and energy requirements, depending on end use, whilst there are some ready centres in West London. This accompanying need should be considered for West London's digital connectivity development.

More broadly, the National Infrastructure Commission 5G report[253] recommended exploring commercial options to improve mobile coverage on roads and rail. The areas for development include commitment to full mobile phone signal on all major roads, led by DCMS, and the development of Connected and Autonomous Vehicles (CAV), led by DfT. Demand for 5G connectivity on roads is being explored and how road authorities and mobile network operators can work together and share infrastructure. CAV pilots are being led with the West Midlands CAV testbed and the Centre for Connected and Autonomous Vehicle (CCAV).

The following sets out some Use Case developments across the UK.

Case studies: Current 5G Use Case Trials[254]

5G Create, is a competition for innovative new uses of 5G as part of a £200m DCMS 5G Testbed and Trials programme (5GTT), where a number of testbeds have been funded across the UK with match-funding with technology and telecoms companies, SMEs and local authorities . This programme aims to encourage 5G deployment and use cases across sectors, industries and regions, and to demonstrate sustainability beyond government funding. These include the use of open access 5G infrastructure and network solutions. The following provides case studies from this fund.

1. **5G connected and autonomous logistics (CAL)** with Sunderland Council, North East Motor Manufactures Group, Nissan and Three. This will develop autonomous trucks to link the Nissan plant with local SMEs in the supply chain for parts and assembly as a test with opportunity for development of CAL to be applied elsewhere. The project's total value is £4.8m, half funded by DCMS 5G Create.

2.**Health network 5G**, Liverpool is using 5G Create to develop affordable connectivity for remote health and social care, improving future resilience and reducing inequalities, as part of a pilot in advance of developing a larger network for health, social care and education services. This partnership includes University of Liverpool, digital providers and public health services. The project's total value is £7.1m, half funded by DCMS 5G Create.

3.**Smart Junctions,** Greater Manchester is using 5G Create to deliver AI traffic controls to reduce congestion and pollution, this will use small cells to connect sensors at junctions as well as supporting connected bus projects and other mobility based public services. This partnership includes Transport for Greater Manchester (TfGM), Vivacity Labs and Weaver Labs, with open architectures and a new network deployment approach. The project's total value is £2.3m, half funded by DCMS 5G Create.

4.**The Trans-Pennine Initiative** is delivering gigabit-capable infrastructure along the existing rail route between Manchester and York with 116km of fibre optic cable. This tests the viability of using

[253] *Connected Future,* National Infrastructure Commission (2016)
[254] 5G projects, testbeds & trials in the UK webpage, UK5g innovation network. Accessed at: https://uk5g.org/discover/testbeds-and-trials/

the rail corridor to deploy high capacity, cost effective fibre that can be extended to line-side businesses and communities through telecoms operators and internet service providers. It also offers connections at data centres in Manchester and Leeds and other breakout points. This is funded by DCMS as a joint project with BDUK Local Full Fibre Networks (LFFN) and the 5G Testbeds and Trials (5GTT) Programme.

5.**West Midlands Combined Authority (WMCA)** is lead partner for the Urban Connected Communities programme, accelerating 5G adoption by encouraging market participation and driving investment into 5G technologies by aligning the interests of the technology players, market players and users. The West Midlands 5G is UK's first regional 5G testbed and the aim is to create a digital hub with services for citizens and businesses. This was funded by DCMS with £25m for the project.

WMCA has subsequently awarded funding to projects in transport innovation for the region, covering several projects across traffic management, passenger and event travel management, live road and rail infrastructure monitoring and parking management.

4.7.2.3. Challenges

The following table sets out key challenges that have been identified through the market engagement and with sector research.

Table 4-16 - Digital connectivity and infrastructure challenges

Challenge area	Specifics and impacts
Development timelines and potential delays	Several providers commented that developers can register late for digital provision, where it will be better to have this as early as possible. The uncertain nature of the pandemic in the UK and the emerging trends also means that digital needs should be revisited in the near future. Several technologies that are recognised as improving London's connectivity may also become dated where their rollout is slow, this should be a focus of collaboration between boroughs and market providers.
Collaboration need	Coordination is needed between parties including local planning, housing, highway and street work teams alongside developers and providers (digital and other sectors). Failure to do so can reduce effectiveness of roll out – realisation of socio-economic benefits, reduction of costs. Provider examples of where collaboration is needed beyond West London boundary.
Contracts and agreements	Some of the West London boroughs have long agreements in place, for example with lighting assets. Long-term contracts and exclusivity can limit where providers can access and invest and may reduce efficient utilisation of existing assets. Wayleave contracts, between a telecommunications provider and landowners, can be complex and slow to agree. Unclear land ownership can also be a factor here.
Investment barriers	The diverse composition of boroughs in terms of demographics, poverty rates, social housing coverage and density means the investment case varies between areas. Ensuring new investment creates inclusive growth and improves access for communities and businesses is important where viability is an issue.
Market competition	Brings the advantage of lower prices and incumbent challenge. However, it leaves local authorities needing to be proactive to shape their strategies and incentivise local projects for digital inclusion and use cases of high social benefit.
Current short term planning horizons	The planning of providers is generally short-term, up to approximately 18 months, and in response to new development progressing – this does not always support longer-term opportunities
Urban environment	There is a risk of potential cluttering of urban space through 5G connectivity assets. This can be driven by lack of open access and non-exclusivity, or with an ineffective and short-term planning and delivery approach.

Insufficient capacity	5G rollout is initially employing the upgrade of 4G infrastructure, meaning assets can being exhausted relatively quickly for small cell additions, especially where there are gaps in 4G provision.

There is emerging best practice and examples from other local authorities, which can address these challenges and inform an emerging West London Digital Strategy.

Case studies: Hammersmith and Fulham Digital Transformation[255]

Hammersmith and Fulham's Digital Transformation projects fall under three separate agendas - people, place and innovation – and provide useful case studies.

1. People Agenda for Digital

Projects are being taken forward that will address inequalities to technology and high-speed internet access. 'Digital Inclusion for All', with the GLA, is a project with an overarching goal to ensure every Londoner has good, reliable internet access and basic digital skills. This includes digital infrastructure and device provision, with specific training and support for the usability and supply of technology.

An important example is the introduction of assistive technologies through equipment and adaptations to help elderly people and those with disabilities live more independently and confidently at home. Hammersmith and Fulham are also setting up a series of computer clubs and hubs across council estates to teach digital skills to residents, alongside the introduction of MiFi routers to provide localised Wi-Fi signals using 3G and 4G networks. This enhances connectivity in areas currently suffering from sub-optimal coverage and for those living in broadband 'not spots'. This agenda is supported with improved data insight to identify vulnerabilities in the digital space.

In addition, a range of training projects are being implemented, for residents with the Adult Learning Skills Service (ALSS) to build basic skills and confidence in digital and technology use, which will become increasingly important for individuals as new household and workplace interventions emerge and Smart City elements are introduced. For businesses, basic training is being provided to those most in need and upskilling those with little online presence. This has supported businesses in navigating the accelerated trends for online activity and presence through the Covid-19 pandemic.

2. Place Agenda for Digital

Projects under the place agenda include the Connected London project, in conjunction with the GLA, to improve high quality connectivity with support from a digital connectivity Heat Map by postcode and ward. This will help inform on community needs and project design.

A Hyperoptic and Community Fibre Partnership is improving hyperoptic fibre connections and establishing new community fibre centres with good connectivity speeds. This includes free community access from community spaces and will provide more cost effective and fast connections for residents. An important provision through this partnership was home-schooling support to eligible households during lockdown. This project also supports the digital inclusion drive through Hammersmith and Fulham's people agenda, demonstrating an important interaction where digital access provides a critical foundation of future communities.

The borough is also taking forward Smart City Development within its place agenda. A host of improvements for existing infrastructure operation, and the utilisation of real-time data, is being explored to enhance quality of life for residents. These include improvements to the reporting and management of air quality sensing, the monitoring of traffic data and costs to better manage congestion, the provision of LED street lighting, monitoring for flood management, and the deployment of unattended camera technology

The availability of common standards will allow West London's boroughs to compare data and provide greater clarity in assessing baseline needs and emerging opportunities at the sub-region level.

3. Innovation Agenda for Digital

There are further projects in Hammersmith and Fulham which focus on the Borough's innovation agenda. Two examples are provision of EVCPs and the ''Thirty3' Data Platform. The Borough is undertaking a collaborative project with the London Office for Technology and Innovation (LOTI) to

[255] SIDP Engagement: LB Hammersmith and Fulham (2021)

increase the provision of EVCPS. A dashboard has been developed which presents a range of information on a pan-London level to assist understanding of current usage and trends, to help optimise the roll out of future infrastructure.

Thirty3 is a data platform which intends to allow for greater information availability for local authorities and SMEs for their procurement processes. The Thirty3 datastore will improve boroughs' approach to technology procurement and improve collaboration for future procurement.

4.7.2.4. Best practice approach

There are opportunities for boroughs to monetise assets for a 5G offering, though this is limited by the performance and location of fibre infrastructure. It is important to ensure the fibre offer is right first.

It is recognised that the efficiency and timing of micro/small cell deployment can be important in providing an alternative to macro cells/ masts. The costs of small cell deployment can be reduced where more MNOs use them, where longer-term relationships can be secured and where fibre is provided in advance.

5G asset use can be undertaken in such a way to limit disruption, reduce equipment need and street clutter and provide the level of capacity needed for high demand locations. The approach needs to consider coordination between parties (providers, transport operators, developers, boroughs and their planning, highways, lighting, social housing and commercial teams etc.); design steer and codes of conduct; and open access models. For example:

- It is important for boroughs to be involved in the assets that are used and where, there are creative solutions that can include street lighting, smart poles, bus shelters, ad screens, underground chambers, adapted bins, building facades etc.
- Highways are a key enabler in undertaking ground searches, collating data and reducing fibre footprint and using road-side deployment
- Planning templates and exclusion zones can be utilised.
- Asset sharing and non-exclusive agreements support the avoidance of street cluttering, as well as the utilisation of existing infrastructure assets before new assets are added.

The open access model is new, taken forward by only a few authorities to date, and relies on Local Authorities to design and employ policies and procedures and to be informed of their asset mapping. The model has several advantages:

- Based on DCMS guidance and new code;
- Facilitates the deployment of shareable digital infrastructure between MNOs, reducing time and cost;
- Can reduce disruption and better utilise existing assets with greater value; and
- Enables engagement with multiple operators.

Where there are current concessionaires and exclusivity there may be options for small cell deployment or to explore options to work with current operators.

Master wayleaves give the option for coverage across borough housing stock and public buildings and assets such as libraries and community spaces. Wayleaves can pass development areas and places that currently lack fast connectivity to serve growth areas and fill gaps, supporting social inclusion, business productivity, residential quality of life and work from home environments. Delivery of wayleaves for social housing stock can provide affordable connectivity to residents who need this whilst providers benefit with widened coverage and opportunities to serve.

London Case Studies

LB Croydon provide a case study for an open access, non-exclusivity approach to digital connectivity. Croydon are open to proposals on 4G/5G small cells from code operators seeking to deploy in the area, with numerous expressions of interest received so far. Croydon's Digital infrastructure Toolkit was based on DCMS guidance and sets out the definition of requirements, the

engagement process steps, the assessment criteria and asset rate cards for valuation. This includes[256]:

- a process with expression of interest that defines scope, deployment approach, technical approach, the identified assets and project timelines

- a technical approach covers a management information system, the deployment of shareable infrastructure, use of existing fibre infrastructure (duct, cabinets) and council street assets and current contractors

- the commercial approach has included flat rate cards for assets, non-exclusive access and terms whereby if an asset is not deployed in 12 months then the license becomes void

- assets will be assessed before deployment and once deployed these will be managed with mediation with operators

- the engagement process includes important step for highways engagement to agree preferred approach and joint site surveys of assets

- the engagement process includes important step for planning teams in pre-application and application

- the engagement process includes important step for legal team in contract negotiation

The City of London also provide a case study for small cell deployment with 200 small cells following a process of detailed designs going to planning and highway teams, where devices are compatibly designed with current street assets. This has been supported with a standardised wayleave template.

4.7.3. Strategic need and opportunity

An at pace roll-out of 5G will give consumers mobile internet speeds between ten and twenty times faster than 4G. 4G can provide speeds up to 150Mb/s and has averages of 25-25 Mb/s, whilst 5G is averaging 150-200 Mb/s and can reach 1 GB/s[257]. This will enable devices to be used for a wide range of services and apps on the go, with smart devices in homes, workplaces, centres of leisure, high streets and through journeys with larger data transfers, reliability and minimal time lags. Recent estimates suggest that data consumption in the UK increased by 217% between 2014 and 2018, whilst Ofcom estimate that with the significant growth in the number of connected devices (12-fold by 2026) mobile data usage will grow at over 30 per cent a year[258].

The next generation of mobile networks will help meet data consumption demand from the mobile market. To bring super-fast connections to mobile devices, many more cell sites will be needed, especially in high footfall areas. The retrofitting of existing infrastructure for small cells to host 5G equipment will minimise the need for new masts.

This scale of 5G enhancement requires accompanying full fibre to premise (FFTP) provision, this was identified clearly and consistently across the West London digital market engagement. Full Fibre is optic fibre cable connected to premises and can deliver gigabit-capable broadband speed as the most reliable way of delivering high speed broadband connectivity. Full fibre replaces copper cables for the last connection to premises from cabinets (FFTC).

Research has been undertaken that identifies a significant productivity benefit from a 5G step-change, supported by full fibre. This estimated a productivity gain of £38 billion to 2025 and £120 billion to 2030 across the UK[259]. For West London, productivity gains to 2030 are estimated at nearly £17bn for inner West London and £6bn for outer West and North London. These benefits come from increased speed and capacity, greater coverage and reliability, connecting more devices to the network and better connectivity for the internet of things and for customer experiences.

The digital market engagement emphasised that there is a clear opportunity for West London to utilise its role as a significant economic centre with a large population to build engagement and relationships with market operators as part of a digital infrastructure strategy. This strategy can be shaped by West

[256] WLA Digital Group engagement with LB Croydon, September 2020; and the LB Croydon Digital Toolkit
[257] *Levelling Up: How 5G can boost productivity across the UK,* Vodafone, WPI Economics report (2020)
[258] *Review of Latest Developments in the Internet of Things*, Cambridge Consultants for Ofcom (2017)
[259] *Levelling Up: How 5G can boost productivity across the UK*, Vodafone, WPI Economics report (2020)

London boroughs to realise the area's pertinent opportunities over the next 10-20 years, across identified use cases and in enabling digital delivery within Opportunity Areas.

There is an opportunity for West London to develop innovative growth sectors with private sector, higher education and research partners, where digital provision and innovation is a critical component. This could be well integrated with the West London Build and Recover Taskforce.

West London could also commit to providing 100% full fibre and 100% 5G coverage more quickly than central government targets (2025 and 2027 respectively) to send a signal West London is acting as a leader in the UK digital economic recovery.

West London collaboration is recommended with public and private sector consumers and collaborators to drive a stronger case for investment from the market.

4.7.4. Identified needs and options

4.7.4.1. West London wide

West London has a high concentration of businesses and institutions across technological, digital, creative, media, advanced manufacturing, transport and logistics. Further, public services, and health and life sciences have emerging demands for digital connectivity and smart operation and services.

Areas of opportunity for West London have been considered as potential use cases. Some areas are judged to form potential early focuses for innovation and testing, in advance of more detailed assessment of use cases with industry and partner engagement. Those opportunities tagged as having a potential early focus would likely benefit from the WLA taking a leading role to drive these forward with the use of available funding. Others require a strong industry lead to drive the ambition and typically require a larger scale of testing. Table 4-17 also sets out the relevant West London advantages and the Opportunity Areas that may be relevant for their implementation.

Table 4-17 - West London potential use cases

Sector	Opportunity	West London advantages; potential Opportunity Areas focus	Potential early focus (Yes)
Health and social care	Demographic change providing need for services and monitoring for aging population. Examples include remote condition monitoring, assistive technology, remote consultations and emergency response such as 5G ambulance and paramedic feedback to hospitals and consultants. Smart personal and home devices can enable older people to independently live in communities for longer with access to help inside and outside the home. Smart health devices can provide significant savings to the NHS.	Build on current relationships between sector, universities and local government, with hospitals such as Northwick Park, Hillingdon, alongside Brunel Health tech campus.	Y – remote healthcare applications
Mobility	Real-time traffic management with intelligent routing, lane changing, traffic lights and traffic feedback, such as 5G capability cameras to monitor live traffic and control traffic lights. Supports road safety, congestion reduction and step-change in air quality. A market for mobility as a service, with autonomous vehicles alongside electric vehicle facilities providing demand responsive services may potentially be a longer-term opportunity.	A high share of trips originating and terminating in West London. Emergence of new transport hubs and development areas as focal points for end-end mobility and facilities provision. Consider road hotspots including A5, A406 **OAs: Heathrow / Elizabeth Line West Corridor**	Y – traffic management and Electric Vehicles charging link
Logistics	Examples for digital use include real-time management of deliveries, freight	Nationally significant logistics centre, key hubs including	Y – delivery management

Sector	Opportunity	West London advantages; potential Opportunity Areas focus	Potential early focus (Yes)
	consolidation centres and last mile delivery, and emergence of connected and autonomous vehicles (CAVs). Transform West London's logistic role for London and the South East.	Heathrow, Park Royal, and the North circular road, as well as emerging freight consolidation centres. This has a key link to Heathrow going forward and its own freight strategy, as well as emerging proposals in logistic consolidation centres and innovation, including Magway (Transport scheme) **OA: OOC/ Park Royal, Great West Corridor, West of Hounslow, Brent Cross and White City –** and into residential areas	with logistic consolidation centres
Public services	Examples include parking management, circular waste system with smart bins and collection, environmental monitoring and air quality, infrastructure condition monitoring. The cost of managing public sector buildings can also be reduced with smart lighting, air conditioning and facilities management.	West London boroughs cover over 2 million people, with significant population growth, as a diverse population, and with a significant public sector supply chain. **Cross-OA**	Y – air quality and noise monitoring Y- parking management, Electric Vehicles link
Higher education	Data demand for education provision Opportunity to provide interactive student teaching and inputs from international experts. HE role in innovation and partnerships to test and trial	Large and specialised campuses in West London with innovation hub and business linkages. **OA: White City**	Y- test and trials role
Media and entertainment	Media sector provides a demand base for 5G business applications Enhance mobile broadband for live events and management	Concentrations in Hounslow and Hammersmith and Fulham. Wembley stadium events programme **OA: Earls Court and West Kens, Great West Corridor; Wembley**	
Energy and water	Integration of generation, storage and demand management with smart, data-driven control and home and workplace devices. Gas and water leak detection.	Large energy and water consumers, including Park Royal and Heathrow to provide testing at scale. **OA: Park Royal, residential growth at Wembley, Southall, Brent Cross, and cross-OA**	
Advanced industrial	Remote control of warehouse equipment and facilities, factory robotics, supply chain tracking and health and safety management on-site. 5G networks support the emergence and growth of high-tech start-ups across artificial intelligence, automation, virtual reality, robotics and new technologies and connected devices with the internet of things.	Key industrial hubs across West London including Park Royal, Heathrow and M4 corridor, Hounslow as a UK technology hub, as well as established and emerging tech hubs. West London is home to hundreds of technology related businesses in all sectors of the economy.	

Sector	Opportunity	West London advantages; potential Opportunity Areas focus	Potential early focus (Yes)
	Business connectivity for cloud through 5G.	**OA: OOC/ Park Royal, Great West Corridor**	
Retail	Historically threatened by the internet, retail can gain from 5G technology to enhance the consumer experience and build consumer loyalty. Examples include quick try augmented reality and try before you buy, personalised digital messaging and efficient delivery and return of goods and packaging. Further, warehouse management can include smart shelves and inventory management. *Links to logistics use above.*	Key retail destinations including Brent Cross as well as numerous high streets supporting new housing development areas. **OA: Brent Cross/ Cricklewood; White City**	

These use cases will be supported with the mapping of relevant assets (such as TfL, local and town centre street assets), including ducting as this is a key driver of cost, and locations (e.g. hospitals, tech business clusters, freight routes and traffic hotspots). Stronger use cases will exist where the digital infrastructure planning and digital solutions are considered at scale, in testing and then in delivery. There is an opportunity to open up access to borough assets, services and data to enable innovators to test, trial and develop technologies and business models at scale. West London should identify which use cases to focus on initially. The assessment to prioritise use cases should consider:

- West London advantages and the challenge and opportunity it meets;
- The benefits for West London (socio-economic, environmental, growth sectors and enterprises) ;
- Existing infrastructure and networks (with asset and location mapping);
- Interest from the market providers, any market barriers;
- Technological readiness;
- Sector, HEI, innovation and developer partners;
- The cost and revenue streams, including the infrastructure requirements; and
- Applicability to funding streams and partner contributions.

4.7.4.2. Opportunity Areas

The potential use cases are in addition, and in relation, to the large-scale housing and commercial development across West London where this provides a range of opportunities to test and trial new digital technologies across socio-economic groups, places and assets.

The market providers showed more interest in some locations and types of provision in West London than others. These interest areas are driven by viability, where demand will be higher, with density (e.g. multiple dwelling housing blocks), ease of installation and supportive engagement and wayleaves with boroughs. This may bring issues for more peripheral areas and those with currently low development density (like OOC/ Park Royal), as in Section 4.7.2.1. Developers will be less likely to start builds in not-spots, whilst the Opportunity Area sites will require high quality connectivity early on in their development timeline.

A major extension of high-speed fibre is needed for areas affected by slow internet speeds that are also located in strategic growth areas. Public assets including libraries, schools, public and council buildings located in these areas can be connected directly to the super-fast network. The meeting of demands for full fibre to the premise (FFTP) and 5G connectivity with the Opportunity Areas, with complementing wayleaves to serve social housing, can support full fibre and 5G coverage across West London. Boroughs also have a role in understanding their digital inclusion needs and driving this

through provision planning and agreements to ensure service to low-income areas and community hubs.

Focussing investment on areas of high demand and viability will in turn help serve the places in between, with poor provision and not spots, on the spine of full fibre infrastructure. Assets within Opportunity Areas can be effectively accessed and utilised within the early stages of the development timelines to be ready to meet resulting demands. This can also spur the inward investment and location of growth sectors and innovation enterprises within the Opportunity Areas.

The West London development trajectory (Section 5.3) identifies the scale and timeline of growth for the Opportunity Areas to focus the need for investment. Some of the Opportunity Areas are identified as currently lacking provision and full fibre availability (Section 4.7.2.1). Some of the Opportunity Areas are also likely to have specific sector focuses that relate to the use cases, as identified in Table 4-17 above.

OPDC developed a Smart Strategy[260] for OOC/ Park Royal to ensure that technology and smart thinking is at the heart of the regeneration programme. The strategy includes the efficiency of infrastructure, energy use and the shaping and managing of public space. Openreach pilots have also taken place in Park Royal to accelerate connectivity for some its premises with fibre to desk for up to 25% of existing businesses[261]. Further work is needed here to reach more of the businesses and future sites, whilst other industrial areas within West London should be prioritised for improved connectivity.

The OPDC Infrastructure Delivery Plan[262] has subsequently set out smart technology needs at a high level including: high quality and speed wireless and broadband infrastructure; ducting across all places including the strategic road network; open access strategic duct infrastructure in Old Oak North through individual ducts and chambers beneath key routes; and air quality monitoring stations and diffusion tubes across areas. These projects were phased to match the development timing over the next twenty years and it was expected these projects would be delivered and funded by developers, planning contributions and service providers.

Hounslow identified a borough wide roll-out of fibre cable via TfL stations and across public sector assets alongside 5G enablement as a requirement. This was assigned an estimated cost of £45million with GLA, TfL and the Local LFN (LLFN) funding making up a significant share[263].

Table 4-18 below sets out the strategic infrastructure needs for digital connectivity.

Table 4-18 Digital infrastructure needs

Proposal	Description	Suggested delivery	Est. Cost, funding
Full fibre broadband provision Includes duct infrastructure under key routes (road corridor works, TfL stations, WLO etc)	Required for increasing number of properties with FFTP broadband at affordable cost. Enable the developing 5G network.	In place for start of OA development timelines*	To be determined Fibre network providers, developer cost
High quality and high speed 5G wireless connectivity - Small cells and host models	Utilise standardised/ guided access to street assets. Focus on town centres first.	In place for start of OA development timelines 2020-35 across West London and increasing provision	MNOs and digital providers, developer cost
Potential Priority Use Case 1 – to be determined:	Focus and test area to be determined	2021-25	To be determined Digital providers, public sector

[260] *Smart Strategy,* Old Oak and Park Royal Development Corporation (2016)
[261] West London Business engagement, September 2020
[262] *Infrastructure Delivery Plan*, Old Oak and Park Royal Development Corporation (2018) – latest available infrastructure position
[263] *Draft Infrastructure Delivery Plan*, LB Hounslow (2020)

e.g. Parking management and Electric Vehicles charging	Would be applicable for roll out across new development sites		funding streams, and private partners
Potential Priority Use Case 2 to be determined: e.g. Remote healthcare applications	Focus and test area to be determined	2021-25	
Potential Priority Use Case 3 to be determined: e.g. Air quality and noise management	Focus and test area to be determined Would be applicable for roll out across key road corridors and near development construction works	2021-25	
Potential Priority Use Case 4 to be determined: e.g. Real time traffic and logistics management	Focus and test area to be determined. Potential for Park Royal, Brent Cross and Great West Corridor and Heathrow as key freight points and consolidation centres, with emerging technological solutions	2021-25	

Ensuring this is in place early in the development timeline for Opportunity Areas is important. A suggested timeline for each Opportunity Area can be determined, whilst this will interact with borough wide delivery. Section 5.2 provides the categorisation assessment of digital needs and opportunity, and Section 6 the delivery and funding approach.

4.8. Higher education and health provision

Social infrastructure covers a range of services and facilities that meet local and strategic needs and contribute towards quality of life. Social infrastructure includes health provision, education, early years, recreation, community, sports, faith, criminal justice and emergency facilities.

It is recognised that schools and health provision needs will be taken forward in an incremental basis by Boroughs. The SIDP considers social infrastructure of a strategic perspective for West London with a focus on higher education and health provision that is cross-boundary in its needs and opportunity.

Special Educational Needs and Disability (SEND) provision can be suitably considered at the West London level where delivery for Boroughs is over a larger area due to a wide array of needs and the specialised nature of provision. Higher educational SEND provision has also been recognised as lacking and would be appropriately delivered over the West London area.

There have been challenges in effectively engaging with the health sector during the SIDP development, considering the impact of Covid-19, and a representative range of strategic level education providers. Further, the planning and funding framework for these sectors is complex and less well aligned with the SIDP timeline. However, strategic infrastructure needs have been drawn out for education and health provision as was possible at this stage.

4.8.1.1. Strategic policy priorities

4.8.1.1.1. London

The London Plan Policy S1 states that in preparing Development Plans, '*boroughs should ensure the social infrastructure needs of London's diverse communities are met, informed by a needs assessment of social infrastructure. Assessments should consider the need for cross-borough collaboration where appropriate and involve relevant stakeholders, including the local community*.'

Social Infrastructure needs should be addressed via area-based planning such as Opportunity Area Planning Frameworks. Further, Development proposals that provide high quality, inclusive social infrastructure that addresses a local or strategic need and supports service delivery strategies should be supported.

Policy S1 also states that new social infrastructure facilities should be easily accessible by public transport, cycling and walking and should be encouraged in high streets and town centres.

The London Plan also recognises that planning for social infrastructure in London is complex, with a wide range of providers and stakeholders and a varied degree of clarity around future provision and funding. As such, borough collaboration with service providers and local communities is important to understand the existing and future needs. The approach to planning for these needs is largely through borough infrastructure delivery plans and the Community Infrastructure Levy.

In terms of health and social care, Policy S2 states that Boroughs should work with Clinical Commissioning Groups (CCGs) and other NHS and community organisations to:

- Identify and address local health and social care needs within Development Plans, taking account of NHS Forward Planning documents and related commissioning and estate strategies, Joint Strategic Needs Assessments and Health and Wellbeing Strategies.
- Understand the impact and implications of service transformation plans and new models of care on current and future health infrastructure provision to maximise health and care outcomes.
- Undertake a needs assessment to inform Development Plans, including an audit of existing health and social care facilities. Needs should be assessed locally and sub-regionally, addressing borough and CCG cross-boundary issues.
- Identify sites in Development Plans for future provision, particularly in areas with significant growth and/or under provision and to address needs across borough boundaries.
- Identify opportunities to make better use of existing and proposed new infrastructure through integration, co-location or reconfiguration of services, and facilitate the release of surplus buildings and land for other uses.

There is a need for an increase in Special Educational Needs and Disability (SEND) provision in London and it is important that these places are planned for. Some of this provision will be within mainstream schools and some within specialist schools. It is important that all schools are designed to be accessible and inclusive, meeting the highest standards of accessible and inclusive design.

4.8.1.1.2. West London

The North West London and North Central London Collaboration of Commissioning Groups (NWL CCG, NCL CCG) have produced Sustainability and Transformation Plans (STP) that outline strategies for improving services and managing resources to strengthen primary care, mental health and hospital services.

The North West London Health and Care Partnership Five Year Strategic Plan is a response to the national NHS Long Term Plan (2019) and set out the vision in North West London to create one integrated health and care system by April 2021. The estate, along with digital technology enables services to be improved and transformed. The key estate priorities are to:

- Deliver local hubs to consolidate and co-locate primary care services and support a shift of services out of hospitals to community-based locations
- Optimise the use of the existing health estate to reduce void space and the amount of space used for non-clinical purposes, reduce property costs and help transform service delivery.
- Improve the quality of existing buildings to ensure that they are fit for purpose.
- Align estates and technology strategies to maximise the potential impact of technology to transform service delivery and ensure that new buildings are designed to be efficient and technologically advanced.
- Provide additional capacity, where needed, to accommodate demand from population growth and change.
- Prioritise investment in acute, community and primary care estate and maximise the use of NHS capital funds and other funding sources, including developer contributions.
- Work closely with other public sector partners to optimise joint opportunities for estate rationalisation, utilise investment that delivers transformational change, generate financial efficiencies (capital receipts and reduced running costs) and deliver new homes and jobs.

Following the NHS Long Term Plan, the NCL CCG are committed to improving and developing the healthcare estate to support GPs to work collaboratively, to enable the movement of health and care closer to home and the pooling of auxiliary resources. Improving the estate will better support a thriving and resilient workforce. Primary and community care estate development must ensure a wider variety of services can be based within the local community and will support primary care providers in being able to meet the projected population growth and associated increase in demand.

4.8.1.2. Current provision and challenges

4.8.1.2.1. Higher and Further Education

Higher education plays a vital role in ensuring Londoners have the skills necessary to succeed in a changing economy, and for the capital to remain globally competitive. The Mayor has established a forum for higher education institutions and further education establishments to work with boroughs and other stakeholders to plan future developments, including student accommodation, in locations which are well-connected to public transport.

Access to further education is important for skills development and life-long learning and assists with progression into sustainable employment, including apprenticeships. There is a predicted increase in demand for FE provision, due to the growing number of 16-19 year olds.

West London hosts numerous University campuses with a choice of undergraduate and postgraduate degrees, colleges, vocational qualifications and continuing professional development. Further, West London offers advanced research centres, accelerators, incubation space and hubs as strategic assets and draw in investment and talent whilst supporting business growth. These assets also provide innovation across key areas including digital and climate change adaptation. This sub-sector

would be beneficially included in sub-region collaborative work on the infrastructure response to growth, future proofing approaches and actively supporting the clean tech sector growth.

West London's relevant further and higher education facilities include:

- Brunel University
- University of West London
- University of Westminster
- Middlesex University
- Buckinghamshire New University
- Imperial College
- Brent College
- West London College
- Harrow College
- Stanmore College
- West Thames College

West London's accelerators and hubs include:

- Generator at Park Royal
- London School of Technology and Science
- I-Hub White City
- OPENCELL
- Westmont Enterprise Hub (UoWM)
- Central Research Laboratory, Hayes

It is recognised that higher and further education facilities may face difficulties with a drop in enrolments and accommodation take-up following Covid-19, impacting both their financial positions and reducing a key driver of local spend through student presence. Students studying remotely, or who do not enrol at all, will not make the contributions to local spending that many West London businesses depend on as well as their significant employment contributions.

4.8.1.2.2. Special Education Needs (SEN)

There is an increased pressure on Special Education Need & Disabilities (SEND) provision particularly seen in pupils with Autistic Spectrum Disorder (ASD). There will be an increase expected in line with the overall growing child population. In addition, more children with SEND are presenting across year groups putting further pressure on resources. The prevalence of Autism Spectrum Disorder (ASD) continues to rise as well as the number of children of school age with significant additional needs. Increased cohorts of primary children are also now moving through to the secondary and post-16 phase.

The number of pupils with Education, Health and Care Plans (EHCPs) or statements has grown at a faster rate than the general London pupil population in recent years. Between 2010 and 2017, there has been a 22% increase in pupils with EHCPs or statements in London[264].

The majority of dedicated SEND places are provided by special schools and boroughs have looked to extend this provision. For example, since 2010 all four of Brent's special schools have expanded to meet demand and they now provide for a wider range of needs[265].

There has also been strong growth in places provided in a mainstream context, where boroughs have looked at expansion programmes for mainstream primary and secondary schools to accommodate these needs.

[264] Hounslow IDP (2020), London Councils publication 'Do the Maths' (2017)
[265] Brent IDP (2019)

4.8.1.2.3. Cross-borough health provision

Borough Clinical Commission Groups (CCGs) form integral parts of the North-West London Collaboration of Commissioning Groups (NWL CCG) as a working partnership between Brent, Ealing, Harrow, Hillingdon, Hammersmith and Fulham, Hounslow and West London CCGs.

Barnet is part of the North Central London Clinical Commissioning Group (NCL CCG), alongside Camden, Enfield, Haringey and Islington.

The NWL and NCL CCGs are responsible for commissioning hospital and community healthcare services for the boroughs. NHS England commissions GP, dental, pharmacy and optometry services and specialist services, and oversees the CCGs and their budgets. The CCGs have developed Sustainability and Transformation Plans (STP), as set in Section 4.8.1.1.

There are several major hospitals in the region, including:

- the West Middlesex University Hospital
- Northwick Park Hospital
- Hillingdon Hospital
- Charing Cross Hospital
- Hammersmith Hospital
- Central Middlesex Hospital
- Mount Vernon Hospital
- Harefield Hospital
- Barnet General Hospital
- Edgware Hospital
- Colindale Hospital
- The Royal National Orthopaedic Hospital in Harrow

Engagement has identified the proposed NHS reorganisation and changes to the organisation of clinical commissioning groups as a challenge for the sector.

There has been overall pressure on local authority budgets given the impact of the Covid-19 pandemic, and this reflects a key challenge in the short to medium term.

The ownership and funding mechanism for GP facilities is identified as a constraint to the provision of new primary healthcare facilities in Opportunity Areas. Individual GP practices usually own the freehold of their practice, with funding given to cover mortgage costs. This creates an asset for GPs, which can be realised when they retire, and creates a strong incentive for GP practices to favour freehold rather than rented premises. This can make it difficult to deliver new facilities even where space has been secured for primary care facilities within mixed-use developments.

Boroughs and CCGs are responsible for detailed analysis of health needs in Joint Strategic Needs Assessments. Boroughs have also developed Health and Wellbeing strategies that focus on community wellbeing through early years to old age health. Such local assessments also recognise particular concerns such as childhood obesity, heart disease and stroke, and mental health conditions.

There is a need to build the health related aspects of development, to certain sizes and building standards, that respond to the level of growth and projected demographic changes.

The related infrastructure provision such as premises, transport access and digital provision that is needed to provide a range of health care services should also be responsive to changes in healthcare needs; how people access and use services; demographic change forecasts; and population characteristics across lifestyle, environmental, wellbeing and socio-economic factors.

4.8.1.3. Identified needs

4.8.1.3.1. Higher education plans and needs

Engagement and document review has identified some plans and needs within the sector, as below.

There is a proposed relocation of the College of North West London site from its current Neasden site to Wembley Park as new education centre, given the outdated facilities and the opportunity for more efficient use of space and response to growth at the proposed new site[266].

The University of Westminster are based at Northwick Park, with no current proposals to expand their site.

Brunel University has identified that it is likely that student numbers will continue to grow in the coming years, which will increase the need for accommodation, transport and other elements of infrastructure. In terms of accommodation the university has stated they are likely able to meet the requirement within the campus, subject to appropriate planning and development. However, transport issues remain a concern for the growing number of commuter students, particularly given the proposed development of Hillingdon hospital nearby. There will be a need for the university to work closely with Hillingdon hospital and the local council to ensure shared infrastructure challenges are addressed with holistic solutions.[267]

Buckinghamshire New University has Uxbridge and Pinewood campuses, with important interactions with creative-media partnerships and Hillingdon hospital placements, and in particular offer places to residents across the North-West London corridor. Engagement raised the challenges with connectivity as students lack convenient and sustainable access to and between the campuses, where a bus connection service currently exists between the campuses. The university may also require additional space into the future with the development and consolidation of new offers and facility partnerships including the potential Pinewood transition to an academy. Further, whilst outside the study area, the university campus at High Wycombe is in undergoing Masterplanning for regeneration alongside a health and social care institution, which will impact partnerships within West London.[268]

Generally, green transport and energy efficiency have been highlighted as priorities for higher and further education facilities, alongside their commitments to the UN sustainability goals.

Case study – college provision and pathways to employment

West London College provides construction training courses, apprenticeships and programmes with the core of training provision at Park Royal College in Brent. The college manages the Mayor's Construction Academy West London Hub, bringing together employers and training providers to collaborate strategically, alongside local authorities, charities and the National Careers Service.

The college also offers green skills including retrofit, electrification and environmental sustainability. The college has submitted a bid to Good Work for All, a competitive grant for additional Adult Education budget, focussed on green skills. Capital funding for a Green Skills Academy in Southall has also been submitted. The college is part of a cross college approach for sector-based work academy programme (SWAP) recruitment, including women in construction and apprentice opportunities with Laing O'Rourke, Ardmore and others[269].

These West London College provision areas will continue to be supported with collaboration with boroughs, industry, employers and training providers.

Case Study – Role of higher education and research facilities in West London growth

Imperial College is establishing a climate change innovation centre at its White City campus[270]. The centre will bring together researchers, students, innovators, investors, policymakers, and businesses from across London, with an aim to accelerate the development and growth of London as a world-leading climate change innovation cluster. This follows the recommendation by the London

[266] Brent IDP (2019)
[267] SIDP Engagement: Brunel University (May 2021)
[268] SIDP Engagement: Buckinghamshire New University (July 2021)
[269] SIDP Engagement: West London College (April 2021)
[270] *New centre to put London at heart of zero carbon revolution,* West London Business. Accessed at: https://www.westlondon.com/new-centre-to-put-london-at-heart-of-zero-carbon-revolution/

Sustainable Development Commission[271] for a Cleantech cluster to be established around the Old Oak and Park Royal Development and the White City campus.

The centre will support innovation across several key themes that relate to energy:

- Air quality - atmospheric greenhouse gas removal, improving air quality in cities.
- Buildings - low-carbon building materials, smart building systems, climate resilient building and low-carbon heating and cooling systems.
- Transport - transport without harmful combustion, supporting renewables through energy storage.
- Manufacturing for a low-carbon future - circular systems, resource, process and remanufacturing efficiency.
- Food – with precision agriculture technology, smart systems for climate adapted agriculture, sustainable packaging, and minimising food waste.

The centre will include housing technology development and testing facilities, with incubation spaces, a dedicated accelerator, classrooms and offices. The Centre will provide a focal point for London but will benefit its campus ecosystem with the Imperial College Advanced Hackspace and the White City Incubator, offering an environment for inventors, innovators and entrepreneurs.

Innovations explored here can be considered at West London's Opportunity Area development sites.

A collaborative approach to potential responses to the Covid-19 and enrolment impact on education facilities could be considered. Collaboration and integration is also important in ensuring sustainable transport access to these facilities are included in West London's transport interventions; that energy efficiency strategies can be supported; and linkages are supported to private sector skills and local employment needs.

4.8.1.3.2. Special Educational Needs and Disability (SEND) Provision

The approach to planned SEND expansion is incremental and detailed reviews have been undertaken at the borough level, identifying the need for additional capacity to meet growing demand for SEN places.

The expansion of existing special schools, new SEN provision delivered primary and secondary schools and the creation of SEN units within mainstream schools are all part of the response to anticipated future demand. Option appraisal and partner collaboration between the LA, neighbouring boroughs and local schools have also been recommended.

Engagement and document review has identified some plans and needs within the sector, as below.

Barnet's SEN review has indicated a specific growth in demand for pupils with ASD. Proposals to open a new all-through provision for ASD pupils, The Windmill School, has received approval from the Department for Education and is currently at pre-opening stage. Delays in identifying a site for the school, and growth in other broad areas of need, means additional provision will still be required to meet the demographic growth and increasingly complex behaviour of pupils in mainstream schools. New SEN provision at Whitefield school and Claremont Primary will assist to meet part of the anticipated future demand[272].

Brent is planning to commission additional secondary school places to cater for pupils with ASD/MLD/SLD. This is in addition to a new special free school by the Brent Specialist Academy Trust, which was due to move to a permanent accommodation in Brondesbury in 2021. Brent has also identified demand for places for secondary special school places and post-19 SEN provision.[273]

A particular need has been identified for Special Educational Needs and disabilities (SEND) schools in Harrow.

[271] '*Better Future: A route map to creating a cleantech cluster in London'*, London Sustainable Development Commission (2016)
[272] Barnet Draft IDP (2020)
[273] Brent IDP (2019)

In Hammersmith and Fulham, the Bridge Alternative Provision (TBAP) Multi Academy Trust provides SEN places at primary and secondary phase and this avoids the use of provision out of the borough. At present LBHF has no specific specialist SEMH provision in a school setting and is considering this and alternative delivery models[274].

Hounslow is currently working with mainstreams primary and secondary schools with a view to introducing SEND resource centres, satellite sites, and expansion of existing centres, to help address shortfalls of places resulting from demand for special schools and centres. This includes the Wings Academy special free school for pupils aged 11-16 with Social, Emotional & Mental Health (SEMH) scheduled to be delivered in Sept 2023. There are ongoing discussions with the Academy Trust to firm up the allocation of commissioned pupil places with neighbouring boroughs including Ealing and Richmond.[275]

SEND as is a specialist, cross-boundary and often expensive provision area and is not formally, strategically planned at present. As knowledge of current and future user needs develops, this should be incorporated into a West London approach, including appropriate engagement and collaboration with local authorities beyond the West London area.

4.8.1.3.3. Cross-boundary health provision

The projected increase in population and employment opportunities within West London will result in an additional need for health services as upgrades to existing and new facilities in areas of growth. To ensure that development is supported with the sufficient healthcare infrastructure, developers will need to work closely with the boroughs, and collaboration with relevant planning authorities and local NHS providers.

Engagement and document review has identified some plans and needs within the sector, as below.

The West Middlesex hospital is operated by Chelsea and Westminster Hospital NHS Foundation Trust and has plans for a phased redevelopment of the site as a health campus.

NHS Barnet CCG have set out future plans for Colindale primary Care and Community Care facility for 2024 and Brent Cross Primary and Community Care facility for 2028. An Urgent Care Centre is proposed at Barnet General Hospital to meet the increasing clinical demand on A&E services.[276]

Harrow are currently engaging with Harrow CCG in respect of health provision as part of the Harrow Infrastructure Delivery Plan. It is likely that the level of growth proposed would necessitate some new primary care facilities.

Hillingdon Hospital plans for redevelopment are progressing toward Outline Business Case stage. A full redevelopment of Hillingdon Hospital involving a new build on the current site was identified as the preferred way forward[277]. This will be significant development and integration with transport upgrades will be important.

The development of hubs is a key element of Hounslow CCG's Future-proofing Health in Hounslow approach. Hubs are large health centres which will accommodate a range of services including primary care, community healthcare and social care. Significant investment is needed to redevelop existing sites. At present there are five developments planned across Brentford, Chiswick, Feltham, Heston and Thornbury.

As part of the White City Regeneration Area, 5 GP practices and community services have been relocated to improve integration between health and social services at the new Parkview Centre for Health and Wellbeing. Hammersmith & Fulham CCG will be working closely with colleagues in West London CCG and LBHF to identify how a new facility on the Earls Court site will be utilised.

Under the proposals set out by the NHS across NWL and subsequently agreed by the Secretary of State in 2012, Charing Cross Hospital will be redeveloped as a Local Hospital, which will include an expanded primary care hub as well as a range of local and specialist services specifically designed to meet the needs of local residents in Hammersmith & Fulham. It should be noted that currently the London Borough of H&F do not agree or support these plans.[278]

[274] LBHF School Organisation Strategy (2019)
[275] Hounslow IDP (2020)
[276] Barnet draft IDP (2020)
[277] Our plans so far – Hillingdon Hospital Redevelopment (thh.nhs.uk)
[278] LBHF Infrastructure Needs Study (2016)

The OPDC IDP includes a significant need for on-site health facilities, given population projections, as one large health hub is identified for delivery in 2024 in North Acton and Acton Wells, in addition to off-site expansions[279].

There will be a need to continually assess health and education facility capacity and additional needs over the timeline of the SIDP, where these sectors have typically shorter term planning and funding frameworks. Health and education are not specially included in the following Infrastructure Need Categorisation, however some overarching recommendations are made:

- Continued collaboration on social infrastructure, especially health, from the sub-region perspective. There have been particular difficulties of engaging with health during the SIDP, where engagement should be continued going forward and include understanding of a) social infrastructure provision and plans going forward, and b) areas for integration with other infrastructure types, including sustainable travel access and energy strategies to reduce emissions and ensure resilience.
- Education and health destinations should be integrated into the provision of local transport schemes. This includes any West London cycling network and sustainable public transport, including express bus services, where user demand can be modelled and service and facility needs assessed. This will require collaboration across the West London boroughs and their social infrastructure providers.
- The WLA and West London authorities should engage with higher education and health providers in developing the priority digital use cases. This will be part of the West London digital strategy and with private sector providers and innovators.

[279] Social Infrastructure Needs Study Addendum, Local Plan Supporting Study, OPDC (2021)

5. Infrastructure Need Categorisation

5.1. Introduction

This Section presents a process for identifying the most essential strategically significant projects at the West London level, categorising the identified needs for different infrastructure sectors (Section 4).

A clear framework for categorising, and prioritising infrastructure needs at the West London strategic level, is presented and follows an objective, evidence-based and systematic approach. A rationale for which infrastructure should be prioritised is articulated taking account of, and/or supporting the understanding of:

- Those items of infrastructure which perform a strategic role and/or underpin functional linkages between the key growth hubs (Opportunity Areas, Housing Zones or other strategic clusters) within West London and important locations outside the sub-region. This relates to the definition of strategic infrastructure provided earlier in the report (Section 1.3).
- Those items of infrastructure which will have the most significant impact on securing the development and growth trajectory (critical lead in times provided in 5-year increments).
- Those items which are essential to progress significant housing development and/or economic growth.
- Wider strategic policy objectives.
- Value for money considerations.
- Critical risks, abnormal costs or other obstacles to infrastructure provision and delivery.

The categorisation has been developed in parallel to an assessment of the infrastructure schemes development impacts concerning development timing, viability and risks, as outlined below the assessment and as developed in Section 5.3. This provides guidance for prioritising schemes with a wider spatial and growth significance.

The purpose is not to prioritise between different infrastructure types but rather the over-riding degree of need for projects where Section 4 demonstrates that investment is required across infrastructure sectors, where there are interactions between these, and infrastructure sectors and projects have different spatial levels of impact and requirement for a cross-borough, West London delivery approach.

Locally significant projects should be prioritised as part of Borough IDPs relative to other local priorities. Further, infrastructure needs and resultant projects will be necessarily assessed through the Business Case process to determine their feasibility and case for investment. This categorisation provides an initial and indicative assessment of prioritised needs.

5.2. Infrastructure categorisation factors

A criteria-based scoring approach has been undertaken for the assessed infrastructure needs and includes the following elements:

Factor 1: Potential of infrastructure item to unlock significant development: This process sets-out the importance of infrastructure based on its potential to unlock development:

- *Essential* – development cannot physically occur without the investment, so likely to be remediation, drainage and sewers, energy and highways – 4 points.
- *Required* – to mitigate the wider impact of development (e.g. air quality, congestion, social infrastructure) – 3 Points
- *Important* – to creating a sustainable community (landscape, public realm or higher specification for essential or required infrastructure) – 2 points.
- *Supportive* – in raising the quality or appeal of development (wider regional infrastructure) – 1 point.

Across these ratings, infrastructure interventions may be necessary to make the development acceptable in planning terms.

Factor 2: Scale of development unlocked/ supported (direct or indirectly) by infrastructure: To capture an understanding of relationship between infrastructure items and their links to the sites, and therefore, the scale of housing unlocked we will assign scores for the following four categories:

- Over 5,000 units or over 50,000 sqm commercial - 4 points
- 1,000 to 5,000 units or over 25,000 sqm commercial – 3 points
- 500 to 1000 units or over 5,000 sqm commercial – 2 points
- Less than 500 units or 5,000 sqm commercial – 1 points

Factor 3: Spatial configuration of infrastructure schemes that support the development on a differing scale.

- *Strategic metropolitan/ regional* – schemes required to support the development of London and South-East significance – 4 points
- *Strategic West London*- schemes required to support the development of West London wide significance- 3 points.
- *Strategic more locally specific schemes*- schemes required to cater for cumulative impact from multiple sites at key locations within West London- 2 points.
- *Site specific schemes*- schemes required to directly support development in a single location- 1 point.

The first two spatial factors are for wider London, and the West London area, with the latter two being more locally specific. Those impacting the wider London and West London area should be the focus of the WLA, whilst more locally specific projects should be dealt with by the individual LPA.

The sets of scores are then be combined. This criteria-based approach allows infrastructure to be identified that is High Scoring Infrastructure at the strategic West London level.

The factor scores provide flexibility and utility to help differentiate between packages, prioritise certain projects above others and will provide an understanding of what stage in the development process certain infrastructure schemes should be funded to enable development viability.

Further, the infrastructure items are provided with their estimated or suggested delivery timeline, where some proposals need to happen early on for the related strategic growth area's trajectory in enabling the scheme and initial growth levels. Other infrastructure proposals are more medium-long term in supporting longer-term growth and West London aspirations.

Utilising the conclusions of the categorisation and with strategic viability considerations, assessment of the development impacts are set out regarding the deliverability of strategic sites and the extent to which they can be taken forward effectively as part of a wider planning process with the identified infrastructure. This is presented in Section 5.3.

The following section sets out the categorisation of the strategic infrastructure needs by sector table.

5.2.1. Sector led categorisation

Table 5-1 Strategic Transport Infrastructure Proposals

Proposal	Overview	Suggested delivery	Cost est.	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
WLO	Improve orbital travel in the outer London boroughs, connecting North to West London. Supports housing development around stations	2029-35	£500m	Multiple OAs (Wembley, Brent Cross, Great West Corridor, OOC)	Essential **4**	4 OAs directly, a further 5 indirectly with local regeneration priority areas **4**	Strategic metropolitan - **4**	**12**
Electric Vehicles and Future Mobility – hub infrastructure	A consistent West London approach. Cross OA scheme. Focus on rapid super charging hubs and induction charging at Opportunity Area commercial/ residential centres. Respond to emerging electric or hydrogen HGV developments Potential initial focus at OOC/ Park Royal, Great West Corridor – Heathrow, Brent Cross	2022-35	To be determined	Cross OAs (as specified)	Essential - **4**	Cross OAs **4**	Strategic – metropolitan **4**	**12**
Willesden Junction Interchange	To accommodate future growth within Old Oak, multi-modal facilities, public realm, freight provision	2021-27	£50m	OOC/ Park Royal	Essential **4**	OOC/Park Royal **4**	Strategic West London **3**	**11**
OOC/ Park Royal rail package	OOC and enabling rail – Harlesden, West London Line viaduct, Old Oak Common Lane	2020-35	£300m +	OOC/ Park Royal	Essential **4**	OOC/Park Royal **4**	Strategic West London **3**	**11**
OOC/ Park Royal road and cycle package	Enabling and sustainable mitigation works for development	2020-35	£250m +	OOC/ Park Royal	Essential **4**	OOC/Park Royal **4**	Strategic West London **3**	**11**

Proposal	Overview	Suggested delivery	Cost est.	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
OOC/ Park Royal bus package	Enabling bus network for development and growth	2020-35	£50m+	OOC/ Park Royal	Required **3**	OOC/Park Royal **4**	Strategic West London **3**	**11**
A406 corridor improvements	Pedestrian and cycle bridges, sufficient sustainable mode access between development areas, junction works	2022-35	£100m	Brent Cross, Wembley, OOC/ PR, GWC	Required **3**	Across 4 OAs and further sites **4**	Strategic metropolitan - **4**	**11**
Great South West and wider roads	Upgrade and redesign to this part of the road network is important given the significant growth across Hillingdon, Ealing and Hounslow	2022-30	£100m +	West of Hounslow Southall Hayes	Essential **4**	Across GWC, Hayes, Southall **4**	Strategic West London **3**	**11**
West London cycling network	Developing a West London wide cycle network, linking to TfL proposed schemes Spine and local centre hub and spoke links set out in Section 4.2.4	2021-35	To be determined	Cross OAs	Required **3**	Cross OA **4**	Strategic – metropolitan As forms part of pan-London network **4**	**11**
Southern Rail Access to Heathrow	New infrastructure to accommodate South West trains via Bedfont station and Heathrow Gateway	2030-40	To be determined	West of Hounslow	Required **3**	West of Hounslow, Heathrow Gateway **4**	Strategic – metropolitan - **3**	**11**
A5 corridor improvements	Sustainable travel improvements	2022-35	£10m+	Brent Cross to Edgware	Required **3**	Across 2 OAs and sites in Barnet and Brent **4**	Strategic West London **3**	**10**
North Acton station	To enhance accessibility and capacity of North Acton Underground	2021-27	£30m	OOC/ Park Royal	Essential **4**	Park Royal commercial and OOC homes **4**	Local specific **2**	**10**
Brentford-Southall rail link	Better orbital connection. This link would serve passengers between a new station in	2022-27	£60m-100m	Southall	Required **3**	Two OAs **4**	Strategic West London **3**	**10**

Proposal	Overview	Suggested delivery	Cost est.	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
	Brentford and Southall, utilising freight rail line			Great West Corridor (GWC)				
Express bus routes	Identified express bus routes to link strategic growth areas and stations, including Barnet town centres and stations, Hounslow centres to Heathrow. Bus rapid transit (BRT) routes an option with potential focus on: Ealing-Wembley via OOC; Harrow-Hayes-Heathrow, Hayes-Uxbridge; Ealing-Brent Cross; Great West Corridor; and Finchley-Finsbury.	2022-30	BRT £250m+, express bus services £50-100m	Cross OAs (as specified)	Important **2 /** Becomes essential without WLO **4**	Cross multiple OAs **4**	West London strategic **3**	**9 - 11**
Wembley access	New bridge over the Metropolitan Line to serve pedestrians and cyclists, the linking of open spaces and improving great central way access. Wembley Central future additional WCML services.	2025-30	£12m+	Wembley	Required **3**	Wembley OA **4**	Local specific **2**	**9**
Freight Transformation	Emerging technology options for moving freight goods between industrial and consolidation centres, reducing road traffic. Starting at OOC/ Park Royal (Willesden Junction) and south to the River Thames	2022-35 Phase 1 2022-25	£50m+	Cross OAs OOC/Park royal and Earls Court start. Extensions onward.	Supportive - **1**	2 OAs to start - **4**	Metropolitan strategic **4**	**9**
Colindale station	Alongside a new station building, with lift and step free access and public realm improvements, new homes are	2021-23	£22m	Colindale/ Burnt Oak	Required **3**	Colindale/ Burnt Oak OA **3**	Local strategic **2**	**8**

Proposal	Overview	Suggested delivery	Cost est.	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
	proposed to be delivered either side of the station							
Harrow on the Hill station	Better two way access for buses, pedestrianised access and public realm with station modernisation	2022-25	£25m	Harrow and Wealdstone	Required **3**	Some OA and Further local sites **3**	Local strategic **2**	**8**
Greenford line extension	Increase in service between Greenford (Central line access) and West Ealing on the Great Western Main Line and onto the Elizabeth Line.	2022-25	To be determined	Southall OOC/ Park Royal	Important **2**	Links Northolt and Southall to wider WL **3**	Strategic West London **3**	**8**
Further connectivity via the Elizabeth Line and WLO	A series of potential rail schemes for a Harrow Elizabeth Line spur and Wembley link; as well as station linkages for Uxbridge (to Hayes) and Mil Hill and Finchley to the WLO.	2028-40	To be determined	Ealing Southall Harrow & Wealdstone Wembley Hayes	Important **2** *Future potential*	Further growth at OAs Wembley, Harrow, local growth areas **3**	Strategic West London **3**	**8**
Gunnersbury station	Supports access between the GWC and OOC/ Park Royal areas, and up to Wembley. Addresses increased demand	2025-30	£25m	Great West Corridor	Required **3**	Great West Corridor **3**	Local strategic **2**	**8**
Harrow & Wealdstone station	Upgrade to support accessibility and active mode arrival, given growth centred at Harrow and Wealdstone OA. In advance of future additional WCML services.	2025-32	£10m+	Harrow and Wealdstone	Important **2**	Harrow and Wealdstone **3**	Local strategic **2**	**7**
Hammersmith fly-under	Replacing the A4 flyover with a tunnel scheme. This would help better link the town centre to the river, improve air quality, support pedestrian and cycling linkages	2030-40	To be determined, option dependent	Hammersmith Town Centre Earls Court and West Kensington	Important **2**	Earls Court and West Kens **3**	Local specific **2**	**7**

Table 5-2 Strategic Energy Infrastructure Proposals

Proposal	Rationale	Suggested delivery	Est. Cost	Factor 1	Factor 2	Factor 3	Score
Electric vehicle hub charging infrastructure – energy supply	A consistent West London approach for rapid super charging hubs and induction charging at Opportunity Area commercial/ residential centres.	2020-35	To be determined	Essential **4**	Across OAs with first priorities **4**	Strategic - metropolitan **4**	**12**
OOC/ Park Royal decentralised energy	Site Specific Decentralised Energy Delivery. Supported with Scrubs Lane and Car Giant Energy Centre. With rooftop PVs supporting industrial uses	OPDC 0-20 years	To be determined	Required **3**	OOC/ Park Royall **4**	Strategic locally **2**	**9**
Southall Decentralised Energy Network	A district heating network, with large energy centre housing boilers and gas engines producing combined heat and power. Pipe network to Southall East	2023 onwards	£10m+	Required **3**	Southall **4**	Strategic locally **2**	**9**
Wealdstone Town Centre district energy	With Harrow and Wealdstone district energy connection	2024 onwards, as per OA trajectory	To be determined	Required **3**	Harrow and Wealdstone **4**	Strategic locally **2**	**9**
Wembley combined power and district energy network	Rooftop PVS and heat pumps to be utilised. Heat pipes to connect to wider network, number of energy stations to be defined.	2024-30 as per OA trajectory peaks	To be determined	Required **3**	Wembley OA **4**	Locally strategic **2**	**9**

Great West Corridor energy centres and distribution	Rooftop PVS and heat pumps to be utilised alongside network to provide low carbon energy from wider Hounslow area	2024-30 as per OA trajectory peaks	To be determined	Required **3**	GWC OA **4**	Locally strategic **2**	**9**
Hounslow renewable energy generation	2 solar farms – at the Eastern Perimeter of Heathrow for private wiring direct to the Airport to a 3MW capacity, and a Western International Market substation linkage at 9.4MW.	2022-2028	£8m+	Required **3**	West of Hounslow **4**	Locally strategic **2**	**9**
OOC/ Park Royal area electricity network	Old Oak North Substation plus new substations to be determined	OPDC 0-20 years	To be determined	Essential **4**	OOC/ Park Royal **4**	Site specific - **1**	**9**
OOC/ Park Royal area cooling	Area wide cooling network solutions On-site solution for OON	OPDC 0-20 years	To be determined	Required **3**	OOC/ Park Royal **4**	Site specific **1**	**8**
Colindale/ Burnt Oak combined heat and power	Could include energy from waste or ground source heat	2023-28 as per OA trajectory	To be determined	Required **3**	Colindale/ Burnt Oak **4**	Site specific **1**	**8**
Earls Court and West Kensington decentralised energy network	Heat pipe plant and networks, number of energy stations to be defined.	as per emerging OA trajectory	To be determined	Required **3**	An OA network **4**	Site specific **1**	**8**
White Centre combined power and district energy network	Heat pipe plant and networks, number of energy stations to be defined.	2021 onwards as per OA trajectory	To be determined	Required **3**	White City **4**	Site specific **1**	**8**

Hayes district heating network	Building on the Nestle site heating network (committed) for rest of Hayes, with energy centre	2020-25	To be determined	Important **2**	Hayes OA **4**	Strategic locally **2**	**8**
Brent Cross district heating network	Combined Heat and Power and Combined Cooling Could include energy from waste or ground source heat	2021-26	To be determined	Important **2**	Brent Cross **4**	Strategic locally – **2**	**8**
OOC/ Park Royal district heating	Strategic Area-wide District Heat Network – heat extraction from sewer network and other sources Supported with Scrubs Lane and other Energy Centres	OPDC 0-10 years	To be determined	Important **2**	OOC/ Park Royal**4**	Strategic locally **2**	**8**

Table 5-3 Strategic Water Infrastructure Proposals

Proposal	Rationale	Suggested delivery	Est. Cost	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
Cross OAs: supply	Water supply reinforcement, renewal and maintenance of infrastructure. Thames Water and Affinity Water plan to meet growth Particular needs: Trunk mains development near A41 Brent Cross/ Cricklewood; under West Coast Mainline (Brent); the Colne Valley and Crane Valley Trunks to meet growth need (Hayes, Hillingdon);	As per OA schedules 2020-35	To be determined Developer-provider	All OAs	Essential **4**	OA wide **4**	Site specific **1**	**9**
Cross OAs: sewers	Sewer infrastructure reinforcement, renewal and maintenance. Thames Water plan to meet growth	As per OA schedules 2020-35	To be determined Developer-provider	All OAs	Essential **4**	OA wide **4**	Site specific **1**	**9**

	Particular needs: Wembley (Affinity Water); A41 and A5 corridors; Hammersmith and Fulham (high capacity utilisation)							
Cross OAs: water re-use	Development water re-use: Rainwater harvesting and greywater recycling systems. Particular use for commercial areas and alongside flood mitigation for development sites (flood priorities below)	As per OA schedules 2020-35	To be determined Developer-provider	All OAs	Essential **4**	OA wide **4**	Site specific **1**	**9**

Table 5-4 Strategic Flood Management Infrastructure Proposals

Proposal	Rationale	Suggested delivery	Est. Cost	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
Hammersmith and Fulham Riverside flood defence	Flood walls investment – to be assessed to protect new wharf sites, maintenance to meet TE2100 requirements	Tbc longer-term	To be determined	Fulham Earls Court & West Kensington	Essential **4**	Flood zone homes **4**	Locally strategic **2**	**10**
Silk stream and Greenway	Colindale flood alleviation scheme	2023-	To be determined	Colindale/ Burnt Oak	Essential **4**	OA development **3**	Locally strategic **2**	**9**
Southall flood alleviation	Critical Drainage Area 5 – Southall, Yeading Lane – studies pre OBC Southall flood alleviation	2022 onwards	To be determined	Southall	Essential **4**	OA development **3**	Locally strategic **2**	**9**
North Acton	North Acton Flood Alleviation Scheme	2024-30	To be determined	OOC/ Park Royal	Essential **4**	OA development **3**	Locally strategic **2**	**9**
Wealdstone flood alleviation scheme plus green infrastructure links	Wealdstone Brook Flood Alleviation Scheme Undergoing studies before OBC stage. Relates to foul sewer, fluvial and pluvial flooding. Partnership project with the EA & TW led by Harrow.	2022-	TW and TRFCC levy; tbc	Harrow & Wealdstone Wembley	Essential **4**	OA development **3**	Locally strategic **2**	**9**

Storm relief sewer network, Counters Creek	Upgrade and connect sewer system through Counters Creek catchment as part of Flood Alleviation Scheme	2022-25	To be determined	White City	Essential **4**	OA development **3**	Locally strategic **2**	**9**
Frogs Ditch and Cranford Park Flood Alleviation Scheme	Detailed plans due for development. EA studies pre OBC approval	2020-25	£0.5m	Hayes	Essential **4**	OA development **3**	Locally strategic **2**	**9**
Critical Drainage – M4 Cranford and North Hyde	Increase capacity and implement flood plan	2022-30	£1-10m range	West of Hounslow	Essential **4**	OA development 3	Locally strategic **2**	**9**
Strategic area SuDS **cross-OAs**	Strategic SuDS in developments and public open space to reduce runoff to roads. Use of green roofs and permeable paving where suitable	As per OA trajectories	To be determined	**Across OAs**	Required **3**	OA development **4**	Locally strategic **2**	**9**
Barnet catchment Flood Alleviation Schemes	Decoy Brook critical drainage area 18; Mill Hill Circus flood storage area; Muswell Hill catchment Studies being undertaken before OBC stage	2021 onwards	To be determined	Brent Cross Mill Hill	Essential **4**	OA development **3**	Site specific **1**	**8**
Grand Canal SuDS	SuDS connected to Grand Union Canal; canal improvements for conveyance capacity	OPDC 0-10 years	To be determined.	OOC/ Park Royal	Required **3**	OA development **3**	Locally strategic **2**	**8**
Stamford Brook reroute	Reroute of Stamford Brook Sewer along the north of the Canal in Old Oak North	2024-30	To be determined	OOC/ Park Royal	Essential **4**	Some OA development **2**	Locally strategic **2**	**8**
Tokyngton and Stonebridge	Tokyngton and Stonebridge Flood Alleviation Scheme	OPDC 0-20 years	£4m	OOC/ Park Royal	Essential **4**	Some OA development **2**	Locally strategic **2**	**8**
Critical Drainage Mitigation: Overground, Kew Bridge	Increase capacity, flood management This requires updated review	2022-28	£1-10m range	Great West Corridor	Required **4**	Key link to OA **2**	Locally strategic **2**	**8**

Brent sewer network improvement	Sewerage network refurbishment, reduction of run-off from roads, roofs and parking areas	2021 onwards	To be determined	North Brent	Required **3**	Local site development **2**	Locally strategic **2**	**7**

Table 5-5 Strategic Green Infrastructure Proposals

Proposal	Rationale	Suggested delivery	Est. Cost	Strategic growth areas	Factor 1	Factor 2	Factor 3	Score
Improve access within River Colne and Crane Valley Green Grid	Ensure better through access and to river and canal along the green grid and to residential areas. Mitigate potential impact of HS2 route (Colne Valley Viaduct) Integrate with walking and cycling routes	2025-35	To be determined	West of Hounslow Hayes Uxbridge	Required **3**	Sites in vicinity with access **3**	Strategic West London **3**	**9**
Green gateways along the A40 and A4 and new local parks at White City and Earls Court	New public space integrated with the Elizabeth Line and Thames Tideway Tunnel. Local park spaces of approx. 2ha Corridor waking and cycling Surface water flood risk	2022-30	Not yet determined, a.£10m+	White City Earls Court & West Kensington	Required **3**	Significant access for 2 OAs **4**	Locally strategic **2**	**9**
Grand Union Canal towpath improvements	Utilise this asset to enhance benefits of connectivity between residential and employment areas Direct walking and cycling route with interaction to wider	2021-35	£20m base estimate (Ealing sections)	OOC/ Park Royal Southall Hayes	Required **3**	Access across 3 OAs **4**	Locally strategic **2**	**9**

Brent River Park and Greenway	Brent River Park restoration south of Wembley. Greenway links from with Alperton (meets Grand Union Canal), A406 corridor (address severance toward Stonebridge Park) and through to Brent Cross via Brent Reservoir Link to walking and cycle routes – to Willesden, WLO stations and North Wembley Flood mitigation around Wembley Brook	2022 onwards in phases	£2m base (Brent River Park) Developer, EA, Borough	Wembley, Alperton Brent Cross/ Cricklewood	Required **3**	Wembley sites **3**	Locally strategic **2**	**8**
Wormwood Scrubs enhancement	Support its role as district park, create linear parkway through to Earls Court's Counter Creek. Interaction with Grand Union Canal Counter Creek link East-West Cycleway through OOC/Park Royal	2021-38	£15m	OOC/ Park Royal White City	Important **2**	District park role for OOC/Park Royal **4**	Locally strategic **2**	**8**
West of Hounslow development of new local parks and upgrade existing	As part of the Feltham masterplan, 6 parks for the town centre area are proposed. Upgrades to Bedfont Lakes, Hounslow Heath and Hanworth Park Flood mitigation for new development	2022-35	To be determined	West of Hounslow Heathrow area development and/or mitigation	Required **3**	Access for West of Hounslow **3**	Locally strategic **2**	**8**
North Harrow provision and link spaces through Harrow & Wealdstone	Connected network of green infrastructure to improve access where central and North Harrow has some deficiencies	2024 onwards	To be determined	Harrow and Wealdstone Park Royal	Required **3**	Access for Harrow and Wealdstone **3**	Locally strategic **2**	**8**

Great West Corridor green linkages	Improvements to Boston Manor Park and reduce M4 impact. Improve links for walkway and cycling through River Brent, local parks and to Ealing.	2022-30	To be determined	Great West Corridor	Important **2**	Linkages for GWC **3**	Locally strategic **2**	**7**
Brent Valley Park improvement and Brent River Walk through Greenford	Ongoing integrated green infrastructure & river restoration with habitat enhancements Opportunity to join Wormwood Scrubs via A40 green gateway (4,8)	2020-27	To be determined, a.£10m+	Southall Northolt	Important **2**	Linkages for Southall sites **3**	Locally strategic **2**	**7**

Table 5-6 Strategic Digital Proposals

Proposal	Rationale	Suggested delivery	Est. Cost	Factor 1	Factor 2	Factor 3	Score
Full fibre broadband provision	Required for increasing number of properties with FFTP broadband at affordable cost. Enable the developing 5G network.	In place for start of OA site development timelines	To be determined	Essential – **4**	Across OAs, without detailed modelling, extensive units and sqm **4**	Strategic West London **3**	**11**
High quality and high speed 5G wireless connectivity	Utilise access to street assets. With catalyst through commercial use cases in commercial/ industrial centres	2020-35	To be determined	Essential - **4**	Across OAs, without detailed modelling, extensive units and sqm **4**	Strategic West London **3**	**11**
Priority Use Case 1 – **to be determined:** e.g. Parking management and Electric Vehicles charging	Focus and test area to be determined. Would be applicable for roll out across new development sites	2021-25	To be determined			Strategic West London **3**	

Priority Use Case 2 - **to be determined**: e.g. Remote healthcare applications	Focus and test area to be determined	2021-25	To be determined			Strategic West London **3**	
Priority Use Case 3 - **to be determined**: e.g. Air quality and noise management	Focus and test area to be determined. Would be applicable for roll out across key road corridors and near development construction works	2021-25	To be determined			Strategic West London **3**	
Priority Use Case 4 - **to be determined**: e.g. Real time traffic and logistics management	Focus and test area to be determined. Potential for Park Royal, Brent Cross, Great West Corridor and Heathrow as key freight points alongside Magway	2021-25	To be determined			Strategic West London **3**	

5.3. Strategic development impacts

This section collates the individual Opportunity Area delivery rates into combined trajectories covering the West London area in order to ascertain the effect the adjustments have caused on aggregate delivery rates. The trajectories have also been compared to average housing delivery rates for the past 5 years for all of the WLA local authorities (based on Annual Monitoring Report Data) which indicates that the projected totals are not unreasonable based on historical delivery across the respective boroughs.

Set out below in Figure 5-1 and Figure 5-2 are two combined trajectories for West London – the first illustrating the base case trajectory information and the second showing our revised trajectories having taken into account site specific progress on delivery and the potential impact of timing of infrastructure provision. In both the trajectories are higher in the earlier years of the study. This is because:

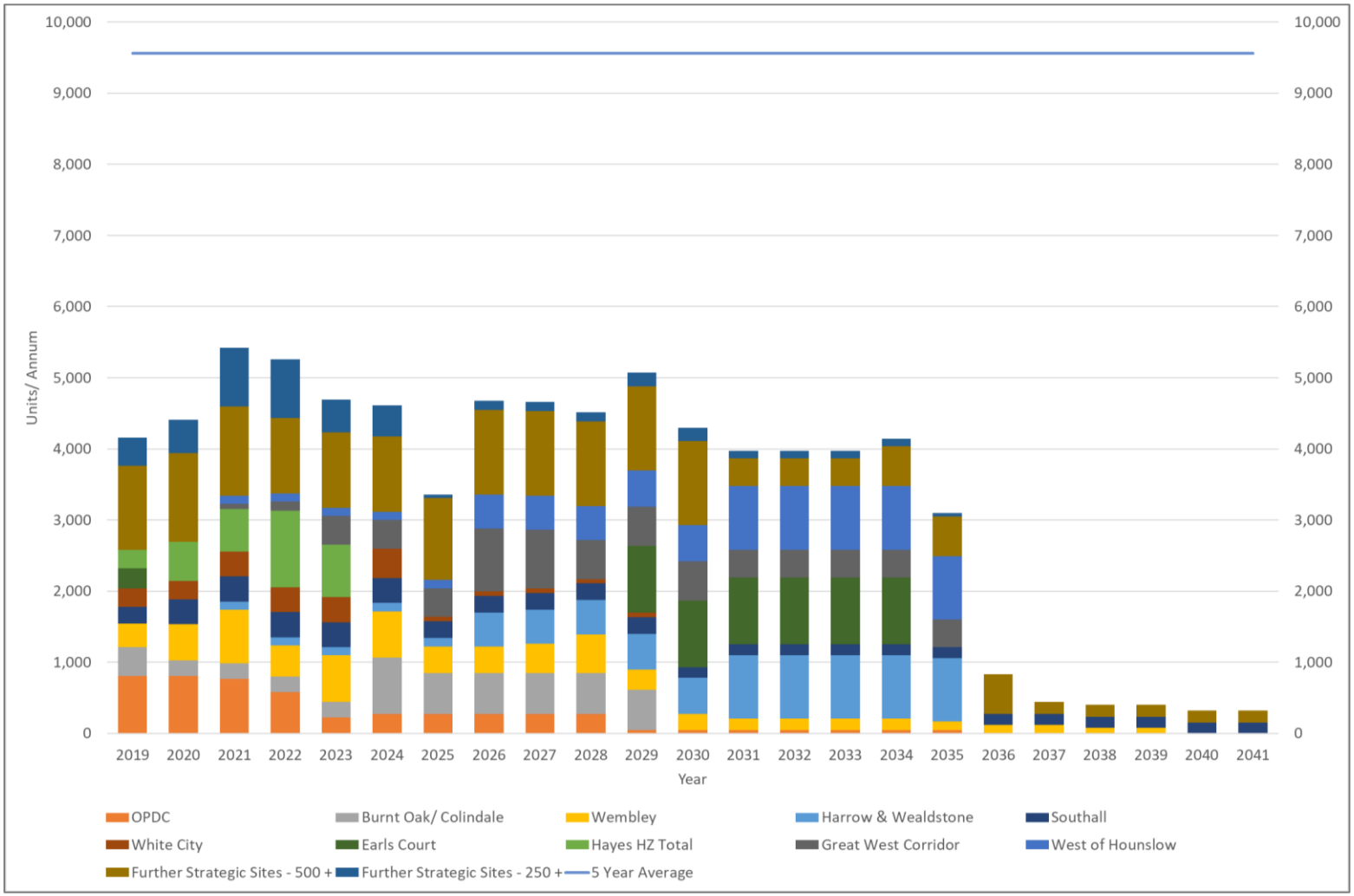
- the majority of the Opportunity Area documents providing trajectory information were written between 2014 and 2018 – meaning the assumptions were frequently that delivery of units would be underway by the date of this report.
- development of many of the OAs are not starting from scratch and are achieving high delivery rates now because they have already had concerted infrastructure investment and delivery over the previous 5-10 years and have seen delivery rates increase as a result.

The main variance between the base case and the updated trajectory is that many of the anticipated delivery levels for the early phases of the study period have been delayed – either due to development not having progressed as quickly as planned to date, overambitious delivery targets, because of delays or uncertainty in terms of the future delivery of infrastructure required to initiate development, or due to the Covid-19 pandemic. The overall delivery period has also extended for these reasons, with more units being delivered later in the study period. A key conclusion for this study, therefore, is that a lack of clarity and certainty around the timing of strategic infrastructure delivery is likely to slow down the pace of housing delivery in West London and extend the delivery period further into the future. Should this issue of clarity and certainty over infrastructure delivery not be addressed, further risks to the pace and scale of delivery over the study period can be expected.

The following details each Opportunity Area's status and the related development impacts of the proposed infrastructure needs to consider their individual trajectories. Appendix A provides more detail on the latest status and progress of the Opportunity Areas within the wider market analysis.

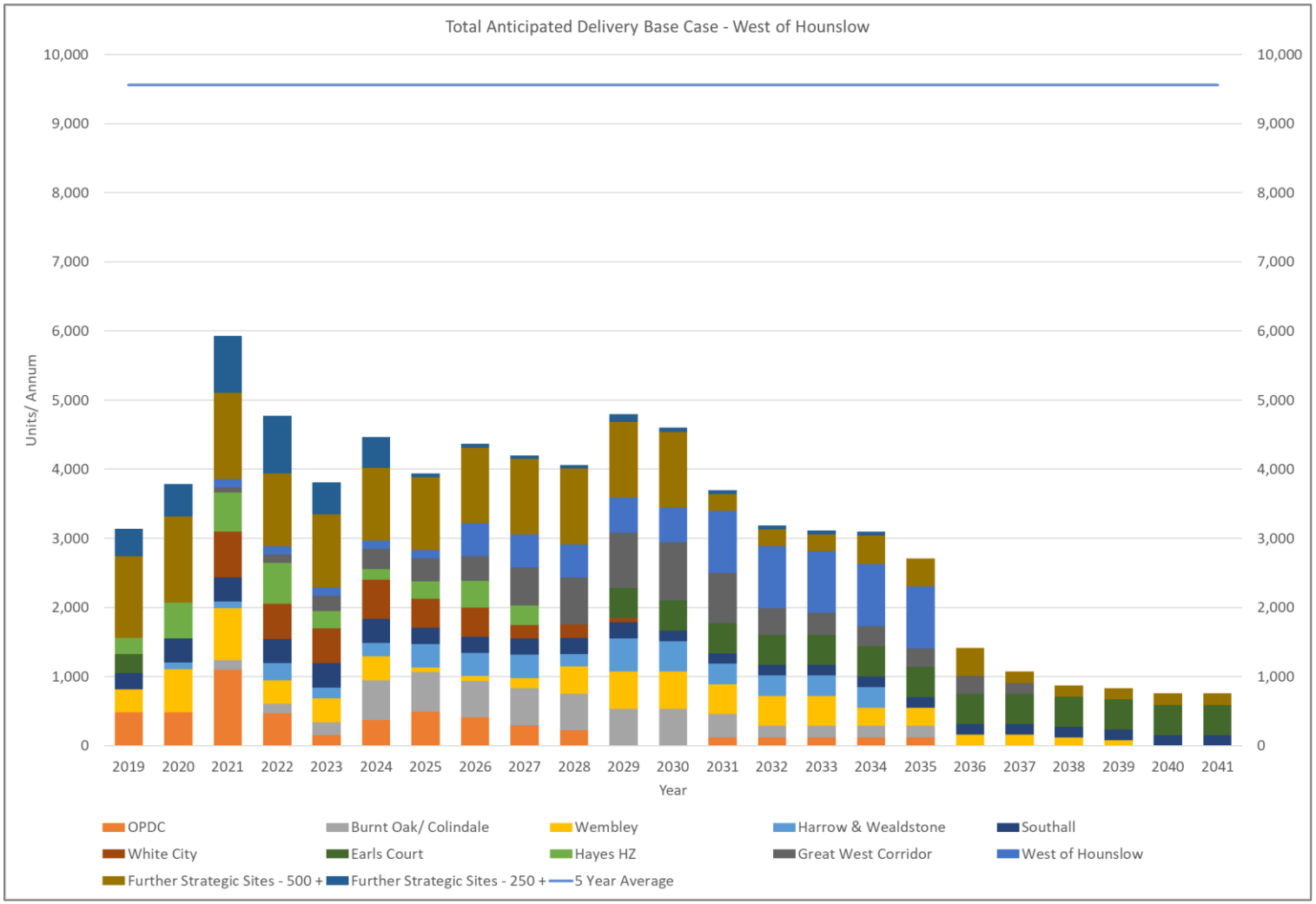
These trajectories are indicative, and should be treated as such, based on the latest available information and professional judgement of longer-term prospects.

Figure 5-1 Anticipated development trajectory – base case[280]



[280] N.B. Average 5 Year Line: Average annual new homes delivery across the whole of the WLA Area in preceding 5 years

Figure 5-2 Anticipated development trajectory - adjusted[281]



[281] N.B. Average 5 Year Line: Average annual new homes delivery across the whole of the WLA Area in preceding 5 years

5.3.1. Brent Cross and Cricklewood

It is our understanding that whilst the wider masterplan has been ratified, housing is only now starting to obtain planning permission and the majority of the proposed development sites are yet to progress beyond this initial stage (see Section 3). The master developer last updated on the progress of the masterplan in July 2018, stating that the start on site has been deferred indefinitely. There is therefore as yet no definitive timescale for delivery of any of the homes or new jobs as set by the London Plan, although it is our understanding that should progress be made, it will likely involve the delivery of additional housing at the expense of job creation.

As such, there is significant capacity for new infrastructure to have an influence on the scale and speed of development in this location, albeit the main influencing factor – the new Thameslink Station – is already central to the masterplan design. Given the masterplan is effectively creating a new town centre and transport hub for the new and existing housing and employment provision, delivering infrastructure connections between the new town centre and the existing areas outside of the Opportunity Area will be vital to ensuring the area's success.

The table below shows the proposed infrastructure projects together with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace of delivery and increasing the scale of development.

Table 5-7 – Brent Cross and Cricklewood - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
WLO	2024-29	£250-500m	The WLO is important in the longer term in connecting this OA to other nearby town centres which will assist in achieving its full scale of job creation in particular. The assessment of short-listed WLO options will determine the route and stations. Regarding the housing trajectory, the WLO is less likely to be vitally important in the shorter term as – as identified in our market study – typically transport connectivity with Central London is the main driver behind housing values (i.e. a proxy for desirability of a location). It is though recognised that Barnet is estimated to have 2,761 housing units of dependent development of from the WLO into the longer-term[282], potentially supporting the OA with its emerging approach to increase housing delivery (up from 7,500 as per the masterplan).
Future potential: Rail and underground capacity	Beyond 2025	To be determined	Adding capacity to Brent Cross and Brent Cross West Underground and Thameslink stations respectively is likely to be vital to the reaching of the full capacity of the OA and achieving target delivery trajectories. How important this is in the unlocking of development will depend on the existing capacity of these stations, and whether or not they are capable of absorbing an increase in the number of people in the short term.

[282] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020)

			Once this capacity has been reached, the completion of the station improvements will effectively form a 'hard stop' on development, with no more happening until they are upgraded to deal with increased passenger numbers.
A5 Corridor Improvements - Sustainable travel improvements	2022-25	£10m+	Clearly, adequate highways access is required to enable development to proceed. Beyond this, however, road improvements are less critical in terms of accelerating or exceeding the OA targets. As noted in the property market analysis, in general public transport links are more important in increasing the attractiveness of an area to purchasers and as such encouraging developers to deliver housing.
A406 corridor improvements	2022-35	£100m	This corridor is a critical link and is identified as a potential barrier or development challenge for the Brent Cross & Cricklewood OA. As highlighted in the Market section of this report (Appendix A) however, road network access is less critical for initiating/ encouraging residential development and so unless there are planning barriers that must be overcome by delivering this infrastructure, in isolation its delivery is unlikely to lead to increased/ accelerated development.
Express bus routes – Barnet to new station and between local centres	2022-25	£50m+	The rationale for including bus network improvements is to address areas of low PTAL values, providing increased accessibility to stations as interchanges. Whilst this is important in integrating the OA with its surrounding areas, it is unlikely to be a major factor in unlocking or accelerating delivery of development on the OA sites themselves.
West London strategic cycling infrastructure – Barnet routes - A5 through to Edgware, Dollis Valley greenway and Barnet Loop. Brent Cross to Wembley	2022-30	Tbc, possible £250k per km	These investments are important in linking housing growth centres, existing residential areas, stations and centres of employment together, and to link the new town centre to other nearby centres. As with bus station improvements, however, these investments are unlikely to have a significant transformative effect upon the housing market that is capable of influencing the trajectory or scale of development.
Utilities			
Brent Cross district heating network	2023-26	To be determined	Required to increase capacity to allow for increased energy usage associated with significant increase in density of residential and employment land uses. Network provision early on in the development lifecycle of the OA is important to be in place in advance of the construction that will require new power sources.
Water supply secure - Trunk mains development near A41	2022-25	Thames Water led	Water supply will be secured early in advance of the OA development lifecycle
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			

Barnet critical drainage	2022-	To be determined	Critical Drainage Area - Decoy Brook Catchment Flood Alleviation Scheme. Decoy Brook Critical Drainage Area corresponds with the southern boundary of the Brent Cross OA, and the Barnet Local Flood Risk Management Strategy ('FRMS') assesses the OA as a High Risk location. The FRMS states that a medium/ high risk location must "develop policies, strategies and initiatives – in the short-term – to increase the resistance and resilience of all new development at risk of flooding".
Strategic area SuDS	2025-	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
New parks provision for Barnet's growth areas	2025-35 in phases	To be determined	Walking and cycling connectivity issues are not likely to present a hard stop that restricts development through physical/ service restrictions. This proposals predominantly seeks to enhance access to green space in response to an assessed deficiency. We do not anticipate these infrastructure proposals to have the transformational capacity to increase or accelerate development, though the park would provide multiple benefits to the OA residents.

No sites or delivery timescales have been identified by Local Authority documents or the Master Developer's own information sources for a number of years, with the whole project effectively 'on ice' until further notice, with no clear reasoning beyond the decision being market led. As the majority of the delivery assumptions for the proposed infrastructure are either the latter half of the 2020s or as yet unknown, this uncertainty is likely to continue at least until the infrastructure that has the potential to create a step change in the values achievable in the area is confirmed.

Given the lack of clarity and availability of information in this Opportunity Area, any attempt to model delivery would be so approximate as to not be a valuable exercise. Should any infrastructure be capable of unlocking this Opportunity Area it will likely be the additional capacity to Brent Cross and Brent Cross West stations, both of which have a lack of clarity around their delivery. The confirmation of a delivery date for these pieces of infrastructure may assist in providing a step change that allows development to commence, although it appears unlikely that there will be any movement prior to the earliest date of completion in 2025.

5.3.2. Burnt Oak and Colindale

The majority of the sites identified within the Burnt Oak Area Action Plan and Burnt Oak, Colindale and The Hyde Placemaking Plan for large scale development as part of this Opportunity Area have commenced or in many cases even completed. As such, we have researched the same area for additional

large scale sites that are yet to commence development and are therefore in a position to be influenced by any proposed infrastructure being delivered in the future.

Of the land identified by the Burnt Oak & Colindale Area Action Plan, capacity for approximately 1,500 units remains without planning permission. Within this land, sites earmarked for approximately 1,000 residential units are still being utilised for their original uses at the time of allocation (Asda and the Edgware Road Retail Park) with no planning application being lodged for either. As such these sites are unlikely to be brought forward in the short term regardless of new infrastructure proposed.

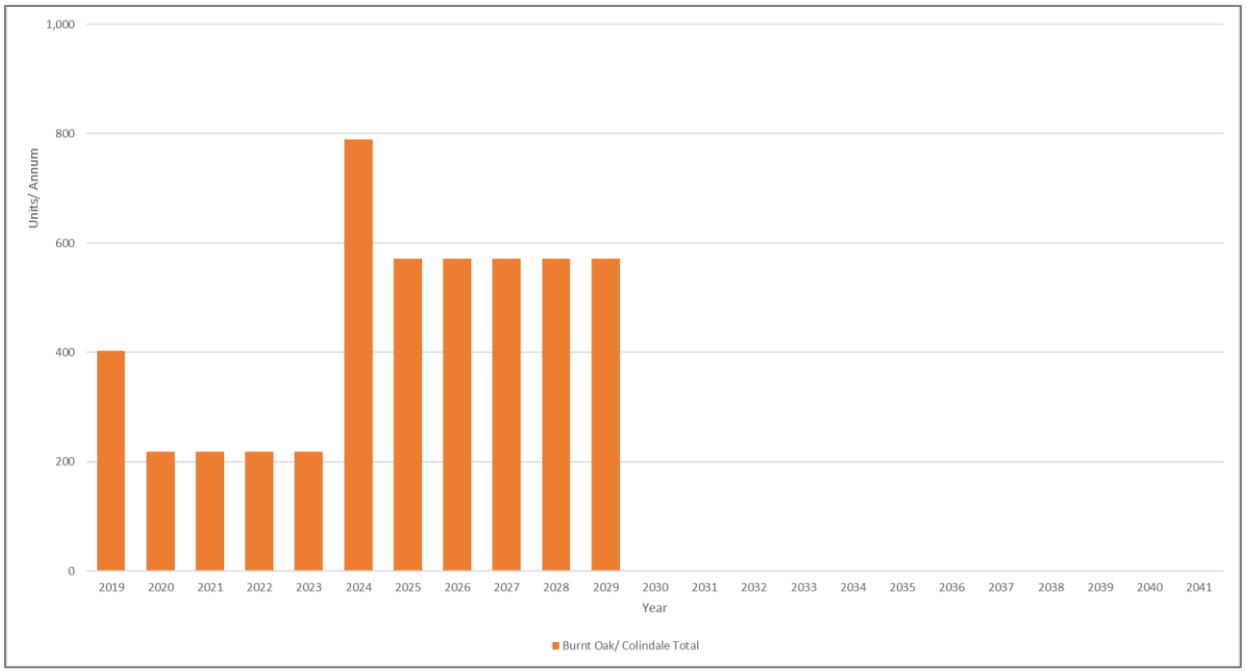
Table 5-8 – Burnt Oak and Colindale - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
Colindale station	2021-23	£22m	The fact that most of the development in this OA is built out or under construction reduces the likely impact of these elements of infrastructure in unlocking or increasing the amount of homes or jobs. There have been noted capacity considerations at Colindale with growing demand in recent years and more anticipated with future growth. As such, any delays to the delivery of this piece of infrastructure could either delay completion of currently on-site development, or more importantly stall some of the latter phases of development on the larger sites.
A5 corridor improvements	2022-35	£10m+	Completion of these works will likely go some way towards negating increased pressures on the existing transport network associated with new workers and inhabitants moving to the area – a consideration that may affect the granting of planning permissions once the road network is deemed to be close to 'at capacity'. As such this infrastructure is likely to have an influence from a capacity perspective, allowing remaining units later in the development cycle to commence. The A406 corridor improvements in particular will likely increase connectivity to the rest of the WLA area, and both have been deemed as 'essential' pieces of infrastructure.
A406 corridor improvements	2022-35	£100m	
Utilities			
Colindale/ Burnt Oak combined heat and power	2023-29	To be determined	This is in response to Heat Network Priority Area designation, with developments expected to provide CHP, rather than responding to capacity issues and as such should not impact delivery.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			

Silk stream and Greenway, Colindale flood alleviation scheme	2023-	To be determined	This schemes are understood to not unlock land for development but rather mitigate flood risk going forward
Strategic area SuDS	2023-29	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
New parks provision for Barnet's growth areas	2025-35 in phases	To be determined	Walking and cycling connectivity issues are not likely to present a hard stop that restricts development through physical/ service restrictions. This proposals predominantly seeks to enhance access to green space in response to an assessed deficiency. We do not anticipate these infrastructure proposals to have the transformational capacity to increase or accelerate development, though the park would provide multiple benefits to the OA residents.

A base case anticipated delivery trajectory for Burnt Oak and Colindale is presented below, with the steady supply of anticipated new homes being delivered up until 2029.

Figure 5-3 Base case delivery trajectory 2019-40 - Burnt Oak and Colindale



Source: Cushman and Wakefield analysis

The status of these sites is as follows:

- Hendon Waterside – Phases 4, 5 & 6: Part of a significant wider masterplan, Phase 4 (418 units) has 366 units yet to commence; Phase 5 (216 units) has yet to commence; and Phase 6 (516 units) has yet to commence.
- New Hendon Village (Grahame Park B) Plots 10/11/12 - 2,088 units yet to commence.
- Beaufort Park – D1/2, D3-7: Part of a significant wider masterplan, D1/2 comprises 142 units with planning granted in 2014 that is yet to start on site, D3-D7 comprises 454 units.
- Silk Park (Sainsbury's) – Full planning permission for 1,309 homes.

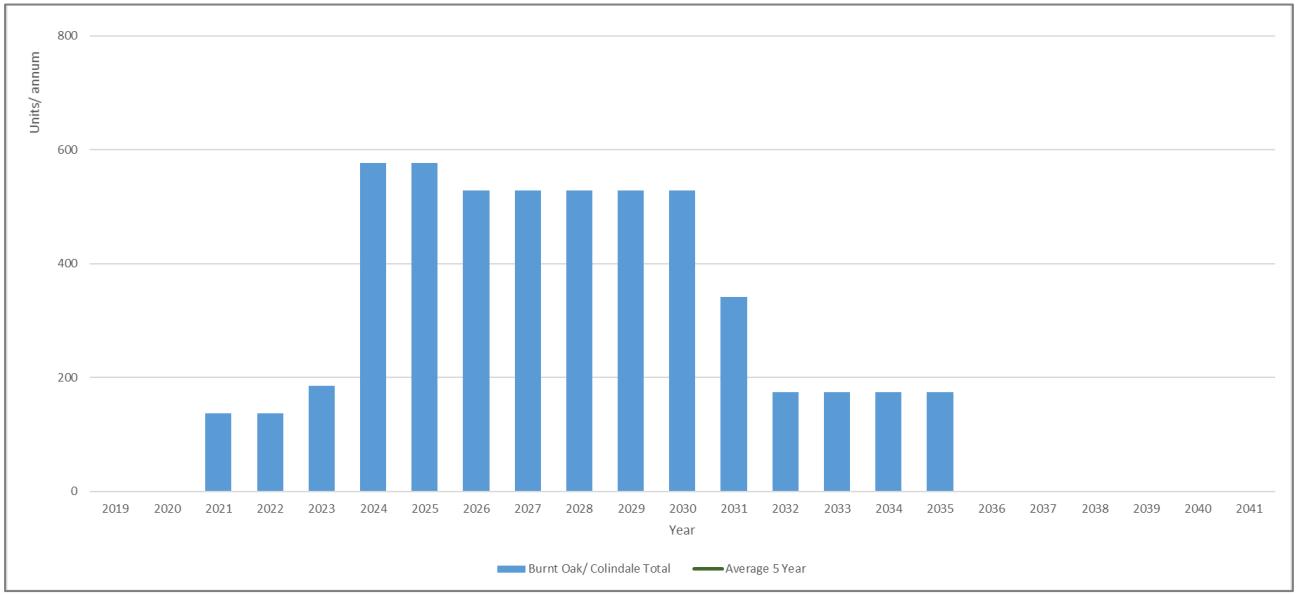
The majority of the developments yet to commence are later phases within existing large-scale development projects, and the spike in delivery associated with these units being delivered currently aligns with the delivery of the improved Colindale Station and the WLO. Given the short and clear timescales –

alongside no flagging for concerns to the delivery trajectory provided – for the delivery of the Colindale Station building in particular, we do not anticipate this being a significant concern.

Due to the scale of these developments and the varied phasing that is required, our adjustment to the base case shown below in Figure 5-4 predominantly adjusts assumptions on delivery rates to provide a more “real world” view of how these units may come forward:

- Reducing the assumed delivery rates at the latter phases of Hendon Waterside and New Hendon Village, between which over 500 units per annum were previously earmarked for delivery, by
    - Retaining the original start on site date for the former and extending the completion date by two years, and
    - Doubling the delivery period for the latter.
- Delaying the start on site date for Beaufort Park (D3-7) by four years to 2021 to reflect the delay compared with the SHLAA assumptions – planning permission was obtained in January 2020
- Delaying the start on site date for Beaufort Park (D1/2) by seven years to 2024 to reflect the inactivity at this site and to avoid it delivering units alongside Beaufort Park (D3-7).
- Silk Park delayed reflecting delays compared with SHLAA assumptions – completions between 2024 and 2030 in line with Silk Park Consultation Document.

Figure 5-4 Adjusted delivery trajectory 2019-40 - Burnt Oak and Colindale



Source: Cushman and Wakefield analysis

5.3.3. Harrow and Wealdstone

Much of the Harrow and Wealdstone housing target of 5,000, and a jobs target of 1,000, is split across multiple smaller sites rather than any sites of significant scale. There is still a significant amount of undeveloped land in the Opportunity Area however, with sites capable of contributing a minimum of c.1,400 units still yet to obtain planning permission in the area. It is also understood that the emerging approach is that the delivery of homes could exceed 7,000 units for this Opportunity Area.

Approximately 50% of the total deliverable units envisioned by the London Plan have yet to have obtain planning permission, and this means there is likely a significant opportunity for the correct infrastructure investment to influence the speed at which development comes forward as well as the final number of homes delivered, and jobs created. However, as highlighted in further detail below, the infrastructure identified for this location is unlikely to be the type that is capable of initiating or accelerating development. Rather, its delivery will be required in order that the Base Case trajectory is not delayed.

Table 5-9 – Harrow and Wealdstone - Development Impacts of Infrastructure

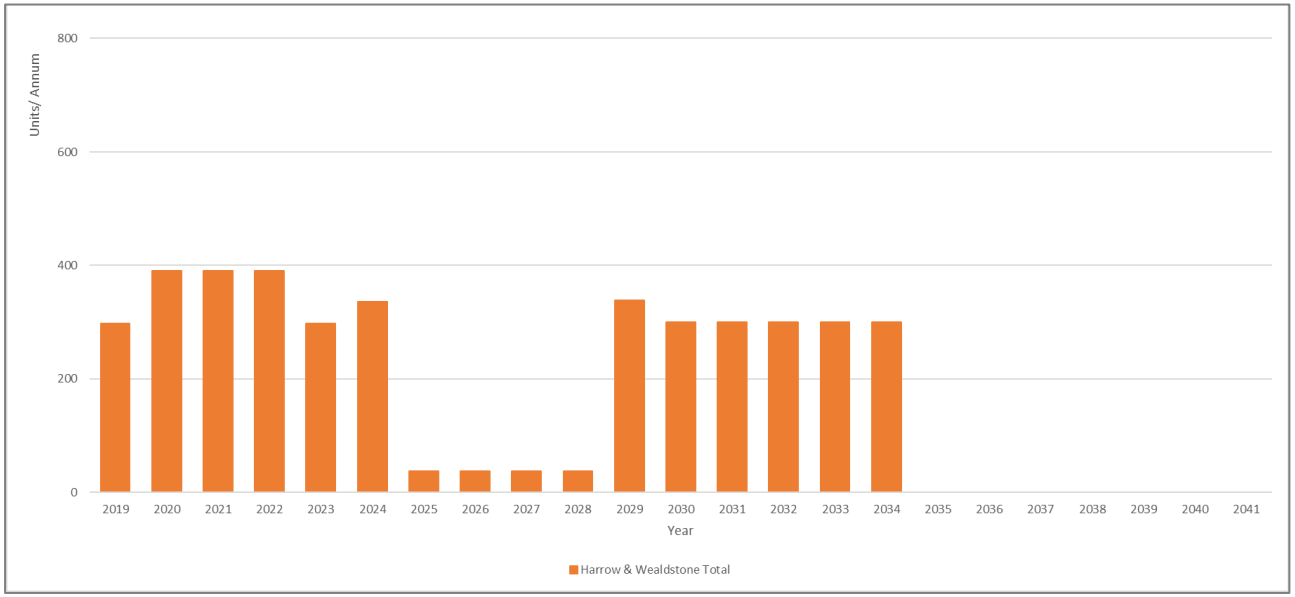
Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
Harrow and Wealdstone station upgrade	2025-32	£10m+	The proposal to upgrade Harrow & Wealdstone Station to support accessibility and active mode arrival to address anticipated growth centred around the Harrow & Wealdstone OA. The proposed timeline for this delivery will need to be confirmed. Much of the development in the area will likely be delivered after this upgrade, as it reflects a main constraint to the delivery of new homes: significant increases in station usage as a result of the new homes will need to be pre-emptively accommodated by these improvements.
Harrow on the Hill	2022-25	£25m	Upgrade to this station will also accommodate growth, where much of the development in the area will likely be delivered after this upgrade, as such any constraint will likely be overcome prior to significant increases in station usage commencing.
West London express bus – express bus services to H&W station, more significant scheme Harrow-Hayes-Heathrow (potential BRT)	2023- 2026-32	Not yet determined	The rationale for including bus network improvements is to address areas of low PTAL values, providing increased accessibility to stations as interchanges. Whilst this is important in integrating the OA with its surrounding areas and through to other West London centres and Heathrow, it is unlikely to be a major factor in unlocking or accelerating delivery of development on the OA sites themselves.
Utilities			
Wealdstone Town Centre district energy	tbc	To be determined	Required to increase capacity to allow for increased energy usage associated with increase in residential land uses. Network and OA connection provision early on in the development lifecycle of the OA is important to be in place in advance of the construction that will require new power sources.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
Wealdstone flood alleviation scheme plus green infrastructure links	2022-	To be determined	Wealdstone Brook Flood Alleviation Scheme: Stated goals of this scheme are as follows: • Transforming up to 10 kilometres of heavily modified river to a more natural condition by 2021 • Creating or improving 12 miles of riverside access for all through the catchment If these are the sole goals, rather than unlocking land for development, this infrastructure is unlikely to accelerate or increase delivery of homes or jobs.

Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
North Harrow green space provision and linked spaces through Harrow & Wealdstone	2024-30	To be determined	These benefits are important in creating a positive environment, though they are unlikely to have a significant transformative effect upon the housing market that is capable of influencing the trajectory or scale of development. Connectivity issues are not likely to present a hard stop that restricts development through physical/ service restrictions, though this supports the sustainable connectivity of Harrow's substantial residential areas to West London's socio-economic assets.

The two main contributors to the first delivery peak are the Civic Centre (946 homes) and Harrow Leisure Centre (840 homes), both of which are delayed compared with the London SHLAA anticipated timescales, and yet to commence on site, or even to obtain planning permission. What is clear is that the majority of the first peak of development will not be starting on site until at least 2022, meaning delays are expected regardless of whether or not key infrastructure is delivered.

The second peak results from the anticipated delivery of the 1,800 new homes at Kodak East, which is anticipated to be brought forward in 2029 – 2034, and which gained planning permission in July 2020 with total homes now anticipated to be 3,000 at the Kodak site. The main concern with this development is that the uncertainty around the OA-wide utility delivery means the local utilities hinder development due to lack of capacity. There is no infrastructure proposed that is likely to incentivise the developer to deliver units more rapidly.

Figure 5-5 Base Case delivery trajectory 2019-40 – Harrow and Wealdstone

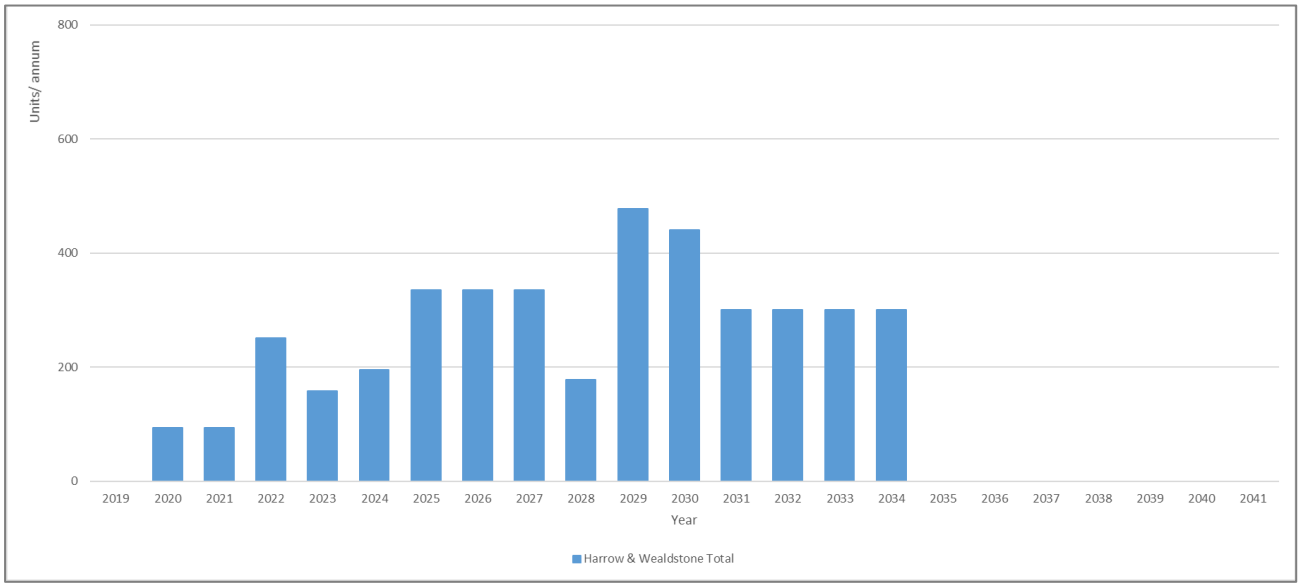


Source: Cushman and Wakefield analysis

With minimal clarity available regarding the existing capacity of local utilities and without more clarity of when the OA-wide transport infrastructure will be delivered to meet growth capacity, it is difficult to estimate how this infrastructure will affect delivery rates beyond the Base Case. Our adjustment to the base case predominantly changes the assumptions made on delivery rates to provide a more “real world” view of how these units may come forwards, including addressing delays that have taken place in real life since the source data was collated:

- Civic Centre, 946 units: Delayed 3 years
- Leisure Centre, 840 units: Delayed 6 years – this and the former site are still being utilised in their current use and so this is an optimistic assumption

Figure 5-6 Adjusted delivery trajectory 2019-40 – Harrow and Wealdstone



Source: Cushman and Wakefield analysis

5.3.4. Wembley

Much of the development land identified as being able to contribute to the total housing delivery in Wembley by the London Plan has obtained planning permission, however a significant amount of this – c.1,900 units – is yet to start on site, with a further c.1,000 units yet to obtain planning permission. Given the anticipated commencement/ completion dates of the schemes with planning or an application in place in this OA are frequently not for several years, it is likely that the identified strategic infrastructure, if not brought forward in a timely manner, will lead to existing infrastructure struggling to cope with the additional capacity requirements resulting from the aforementioned new homes being delivered between 2022 and 2029.

In this OA, the majority of the infrastructure that may cause delays is the utilities capacity for the WLA as a whole, which is addressed below, given the significant scale of development in this location as well as its existing access to high-quality transport infrastructure and more central location that makes it appealing for development.

Improvements to the walking/ cycling routes to improve site access will likely also have an influence on when certain sites will be able to come forward, although given the relatively low cost and straightforward nature of these works, it is unlikely they will be so delayed as to harm the delivery of major schemes.

Timely delivery of the WLA-wide infrastructure will help to accelerate delivery, causing fewer delays to any outstanding planning permissions, and allowing the large-scale developers already operating in the area to deliver at scale without being hindered by inadequate infrastructure.

The table below shows the proposed infrastructure projects with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace and scale of delivery.

Table 5-10 – Wembley - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
WLO	2024-29	£250-500m	Provide improved access from smaller centres to Wembley. The main influencing factor for transport to unlock new homes is improved connectivity to central London; as these enhancements are predominantly linking outwards to other WLA town centres rather than into London, they are unlikely to significantly influence residential or commercial delivery pace or density in Wembley OA specifically. It is important to note however, that these improvements will likely be of significant importance to the areas being connected to Wembley. However, this infrastructure will likely create greater catchment areas for the retail and leisure offering in Wembley as people from smaller town centres in the outer reaches of the WLA area are more able to travel to this larger centre, and therefore could assist in the initiation of more jobs in the area.
Wembley access improvements	2025-30	£12m+	These infrastructure improvements have been identified as being important to facilitate growth at Wembley as they seek to improve pedestrian and cycle access in and around the OA, as well as providing improved access and station links. As such, they are likely to be important (assessed as 'Required') in improving the capacity of Wembley to accommodate the new people associated with increased residential and commercial development. Given the density of development in Wembley, a lot of walking & other access infrastructure will be needed in order to make it a practical location to continue development, in particular the linking of development sites to Wembley Park and Stadium Stations. As such, it is likely that sites reliant on this infrastructure – where they are not responsible for delivering it themselves via S106 agreements – will be delayed until the appropriate connectivity is in place in the wider area.
A406 Corridor Improvements	2022-35	£100m	This corridor is a critical link and is identified as a barrier or development challenge for the Wembley OA; it is described as a required piece of infrastructure. As highlighted in the Market section of this report (Appendix A), strategic road network improvements are less critical for initiating/ encouraging residential development and so unless there are planning barriers that must be overcome by delivering this infrastructure, in isolation its delivery is unlikely to lead to increased/ accelerated development.
West London cycling network	2021-30	To be determined	Whilst the improvement of the cycling network has numerous benefits such as improving access to stations in areas with lower PTAL, reduction in the need for car parking provision at residential and commercial developments and increasing air quality, in isolation it is unlikely to create a significant

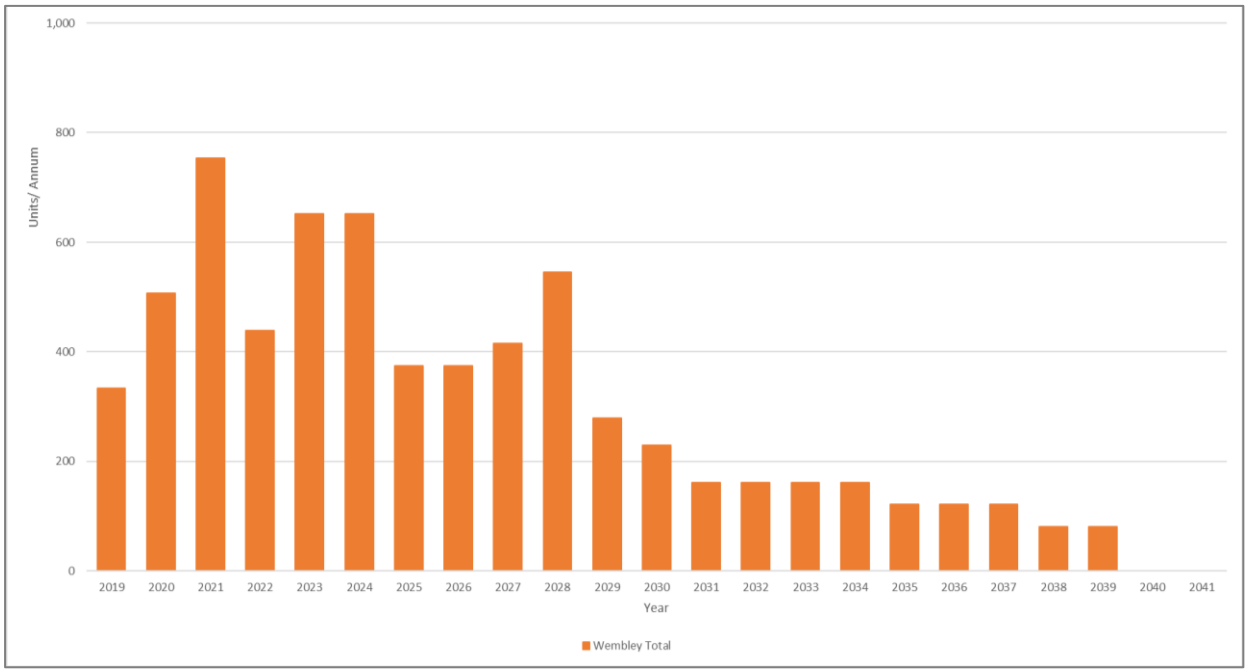
			enough change to initiate development above and beyond the rate that one would anticipate should the cycling infrastructure not be delivered
Freight Transformation potential	2024- First phase to 2024/5	Not yet determined beyond Phase 1 (private sector led)	Emerging technology options for moving freight goods between industrial and consolidation centres, reducing road traffic, these will likely encourage development of additional, job-creating, industrial units in this location, elevating Wembley's position as one of London's important industrial/ distribution hubs
West London express bus – express bus services to WLO stations, to Brent Cross and Ealing. BRT option to be explored.	2024-30	To be determined (£50m+)	Express bus services will improve PTAL and linkages from Wembley OA sites to stations including WLO, whilst linkage to growth areas of OOC onto Ealing and to Brent Cross will help facilitate within West London connectivity for access to employment centres and support Wembley as a destination.
Utilities			
Wembley combined power and district energy network	2024-30	To be determined	Rooftop PVS and heat pumps to be utilised, and heat pipes will need to connect to the wider network. Whilst this is a significant piece of infrastructure, its capacity to unlock/ accelerate delivery is likely limited as it would typically be delivered on a site by site basis, with the wider network already in place. The number of energy stations that need to be delivered are yet to be defined.
Sewer infrastructure reinforcement, renewal and maintenance.	2022-28	Provider	This is in response to high sewer utilisation at Wembley and will need to be implemented in advance of critical area development with specific assessment of capacity alongside other measures to reduce disposal to sewer network. To be addressed by water provider.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
Brent River Park and Greenway	2024-30	£2m base (Brent River Park)	The proposed infrastructure will develop walking and cycle connectivity to various other town centres in West London.

		Whilst these benefits are important in creating a positive environment, they are unlikely to have a significant transformative effect upon the housing market that is capable of influencing the trajectory or scale of development. Connectivity issues are not likely to present a hard stop that restricts development through physical/ service restrictions. However, part of the infrastructure includes flood mitigation around Wembley Brook; should there be development land nearby this infrastructure may unlock it.

Wembley is one of the most significant development areas in London in terms of concentrated scale of new homes and commercial floorspace delivery and has been for a number of years. Given this area is an established centre with strong, recently upgraded transport connectivity, unless the capacity of this existing public transport network is reached in the near future, transport upgrades are unlikely to be the factor that accelerates development here.

As such, it is likely that delivery of utilities in a timely manner will allow housing and commercial floorspace delivery to maintain its anticipated pace as depicted by the Base Case below, causing fewer delays to any outstanding planning permissions, and allowing the large-scale developers already operating in the area to deliver at scale without being hindered by inadequate infrastructure.

Figure 5-7 Base case delivery trajectory 2019-40 - Wembley



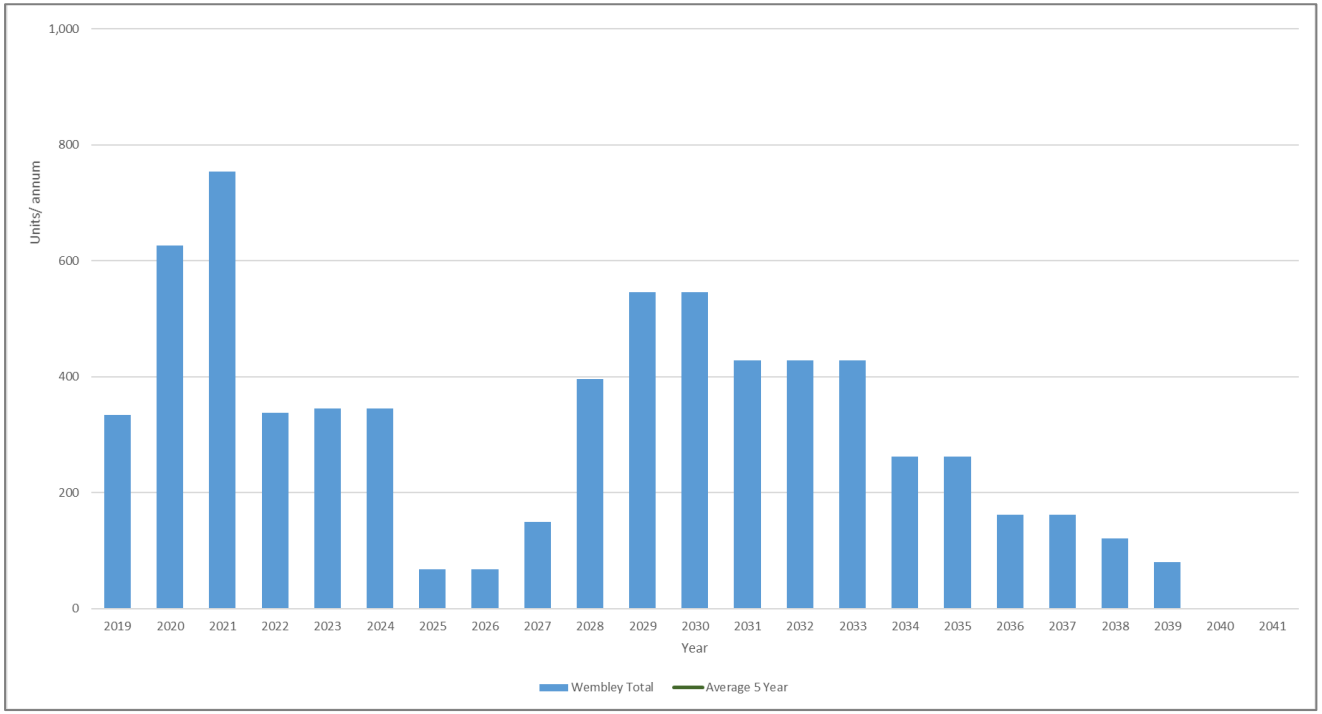
Source: Cushman and Wakefield analysis

However, the degree of uncertainty around when this infrastructure will be delivered may result in delays to the latter phases of development initiated by the various transport improvements/ developments as capacity is reached or the required services are unavailable. In order to account for this uncertainty, in our updated delivery trajectory below we have delayed several of the schemes anticipated to be delivered in the latter half of the 2020s until the mid/ late 2030s. The sites we have delayed are:

- Wembley Retail Park, 995 units: 4 years
- Former Malcolm House, 100 units: 1 year
- Euro Car Parts, 700 units: 6 years
- Asda/ The Torch/ Kwik Fit: 4 years

As such, the anticipated development trajectory for Wembley is presented below.

Figure 5-8 Adjusted delivery trajectory 2019-40 – Wembley



Source: Cushman and Wakefield analysis

5.3.5. Old Oak Common and Park Royal

Old Oak Common has a minimum new homes target of 25,500 homes envisioned by the London Plan. This figure is – as of the date of this report – subject to change due to the removal of several major sites from the OPDC through the Local Plan Examination, which will have the additional effect of skewing the development locus away from Old Oak towards Park Royal. The overall scale of development analysed for the Old Oak Common Opportunity Area in this report is based on the information provided in Appendix A where more detail is provided as to how the delivery totals have been reached; the main sources for information used were the London Plan and the Old Oak Common Local Plan.

The majority of the proposed development sites are yet to progress beyond the early stages of development, with the trajectories provided in Section 3 demonstrating the potential for the delivery of c. 3,250 units by the end of 2020. This Opportunity Area is currently very active from a development perspective, with 3 sites currently selling units or completed, and 10 either on site or with a recently obtained planning permission.

Due to the scale of development planned for the Opportunity Area in the coming years, there is significant opportunity for new infrastructure provision to have an influence on the scale and speed of development in this location. However, the main influencing factor – the new Old Oak Common Station – is already central to the masterplan design, and much of the land being brought forward for redevelopment will already be accounting for this piece of infrastructure being delivered. Once this has been confirmed and delivered, we will start to see developers and landowners account for its delivery.

The table below shows the proposed infrastructure projects together with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace of delivery and increasing the scale of development.

Table 5-11 – OOC/ Park Royal - Development Impacts of Infrastructure

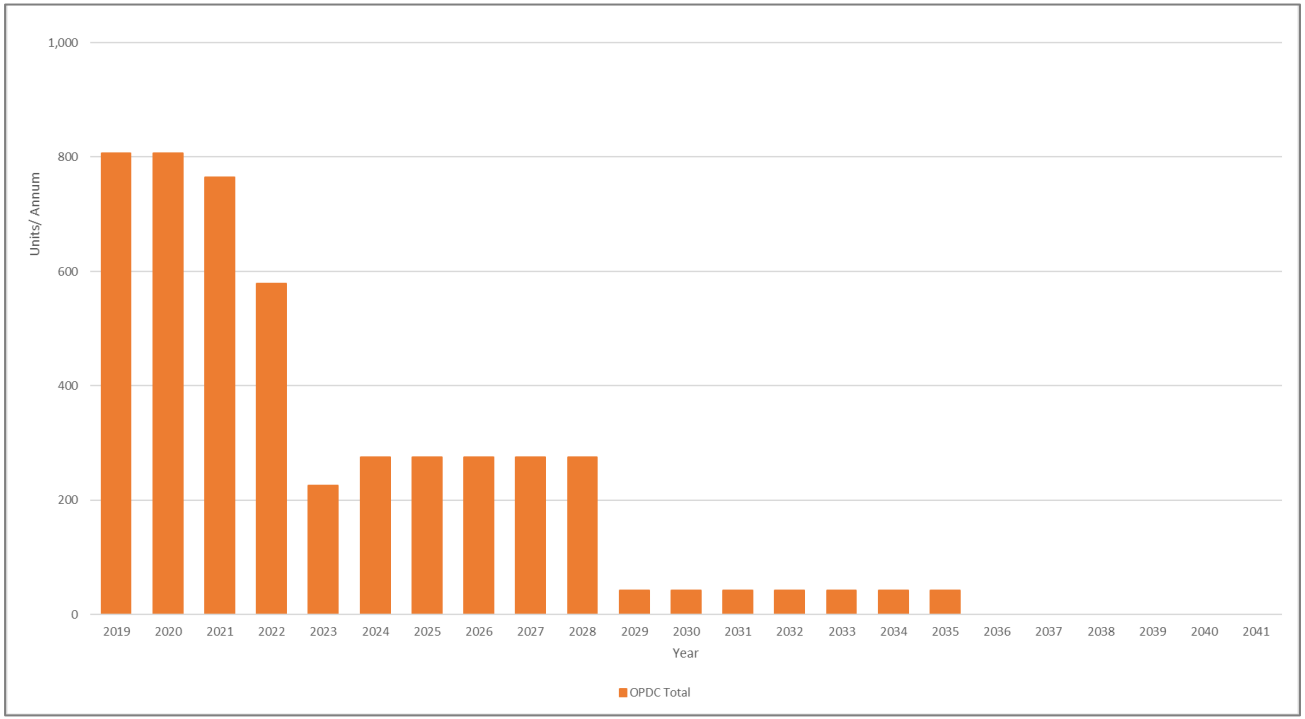
Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
WLO	2024-29	£250-500m	As highlighted in the Market Analysis section of this report (Appendix A), the influence of access to the transport network is significant on the desirability of a location and therefore the likelihood of developers commencing construction. However, when infrastructure of the scale of the WLO is announced – in particular in a location such as OOC/ Park Royal where previously there was little prospect of dense housing delivery due to a lack of connectivity – the confirmation of the new infrastructure is as important to developer interest and confidence as its eventual commencement/ completion, with developers often seeking to purchase land at lower values and deliver housing in anticipation of the new infrastructure completing. Therefore, we consider much of the uplift in both housing and job creation associated with the WLO to have already be accounted for in the various OPDC plans, and the principal influence that the WLO could have is by accelerating completion dates. This aligns with the WLO Economic Narrative report.
Willesden Junction interchange	2021-27	£50m	Likely to have an influence from a capacity perspective, as the completion of these works will go some way towards negating increased pressure on the existing transport network associated with new workers and inhabitants moving to the area. This may affect the granting of planning permissions once the road network is deemed to be close to 'at capacity', at which stage the delivery of this infrastructure will be key to unlocking the remaining proposed developments.
North Acton Station	2021-27	£30m	
OOC/ Park Royal Rail Package	OPDC 0-20 years	£300m+	In order to deliver housing capacity as intended at OOC/ Park Royal, the connectivity of the location will be key, and the delivery of the new transport infrastructure will be vital in that. The Local Plan (2016) states that the station will support the wider Old Oak area in becoming a new strategic destination, highlighting its importance.
OOC/ Park Royal Road and Cycle Package	OPDC 0-20 years	£250m+	

OOC/ Park Royal Bus Package	OPDC 0-20 years	£50m+	However as with the WLO, when transport infrastructure and development of the scale of the OOC/ Park Royal area's is announced – particularly in a location such as OOC/ Park Royal where previously there was little prospect of dense housing delivery due to a lack of connectivity – the confirmation of new infrastructure is often as important to developer interest and confidence (particularly early in the lifespan of the location as at OOC/ Park Royal) as its eventual commencement/ completion, with developers often seeking to purchase land at lower values and deliver housing in anticipation of the new infrastructure completing. Additionally, whilst the bus, road and cycle package are vital in creating a cohesive location, they do not typically provide the step change in local housing values required to increase or accelerate development.
Freight Transformation	2022-35 1st phase for 2024/5	£50m+	Emerging technology options for moving freight goods between industrial and consolidation centres, reducing road traffic, these will likely encourage development of additional, job-creating, industrial units in this location, cementing the OOC/ Park Royal area as one of the most important industrial hubs in London.
Utilities			
OOC/ Park Royal area electricity network Atlas road substation first requirement (UKPN)	OPDC 0-20 years	£40m+	Given the extent and density of development planned in the OOC/ Park Royal area, it is likely that electricity capacity restrictions will – unless the upgrades highlighted here are put in place – put a hard stop on development proceeding. In order to ensure this doesn't take place, utilities will need to be planned carefully alongside development trajectories in order to ensure capacity increases concurrently with the residential and commercial growth.
OOC/ Park Royal area cooling	OPDC 0-20 years	To be determined	Area wide cooling network solutions, Strategic Area-wide District Heat Network, and a site specific decentralised energy delivery supported by energy centres. This infrastructure is likely fundamental to both the delivery of housing and jobs as once utilities capacity has been reached there will be a hard stop on development that will only be cleared by its completion. In some instances, this will be delivered on a site by site basis, but much will be across the whole OA.
OOC/ Park Royal district heating	OPDC 0-20 years	£50m	
OOC/ Park Royal decentralised energy	OPDC 0-20 years	To be determined	
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
North Acton flood alleviation scheme	2024-30/ OPDC schedule	Not yet determined	

Stamford Brook reroute along the north of the Canal in Old Oak North	2024-30/ OPDC schedule	Not yet determined	
Tokyngton and Stonebridge flood alleviation scheme	0-120 years OPDC	£4m	
Grand Canal SuDS	0-10 years OPDC	Not yet determined	SuDS and associated infrastructure is likely to be delivered on a site by site basis, therefore its delivery is unlikely to affect commencement/ completion of homes or job-creating construction.
Strategic area suds	Site schedule	To be determined	
Green infrastructure			
Grand Union Canal towpath improvements	2021-38	£20m base estimate (Ealing sections)	These improvements are intended to enhance connectivity between residential and employment areas via walking and cycling routes and create a number of cycling/ walking linkages with various waterways and to Old Oak Common respectively. Whilst these benefits are important in creating a positive environment, they are unlikely to have a significant transformative effect upon the housing market that is capable of influencing the trajectory or scale of development. Additionally, the issues this infrastructure is intended to address are not likely to present a hard stop that restricts development through physical/ service restrictions.
Wormwood Scrubs enhancement – role as district park interacting with Grand Union Canal	2021-38	£15m	This will support the creation of a cohesive location with the green infrastructure and active mode provision adding to the destination and ensuring high quality access for current and new residents and businesses. Whilst these benefits are important in creating a positive environment, they are unlikely to have a significant transformative effect upon the housing market that is capable of influencing the trajectory or scale of development.

As demonstrated by the anticipated delivery base case below, a number of the sites identified within the OPDC Local Plan dated February 2016 were expected to commence on site and be delivering units already or in the near future. However, some of these sites are not yet under construction. These are North Kensington Gate South, Carphone Warehouse, Perfume Factory North, the Portal, and Mitre Yard, which in total contribute 1,863 units.

Figure 5-9 Base case delivery trajectory 2019-40 – OOC/ Park Royal



Source: Cushman and Wakefield analysis

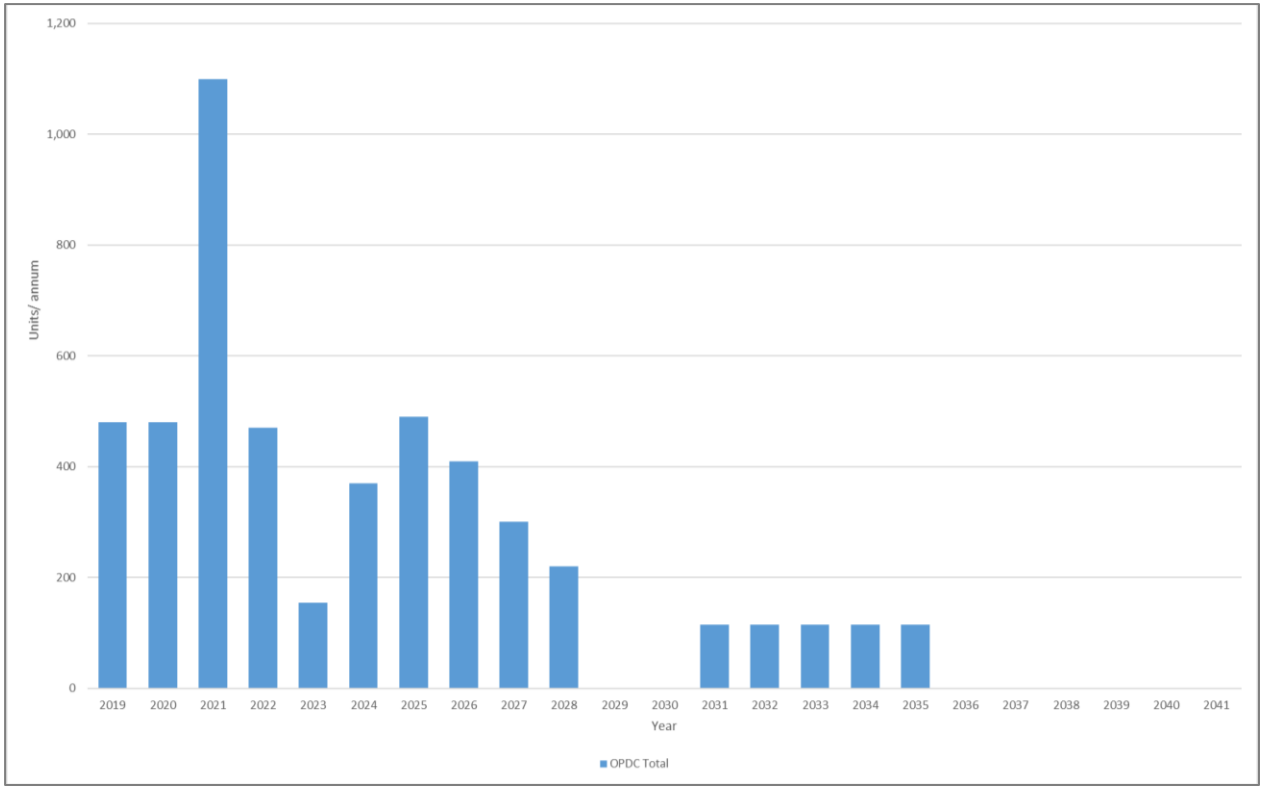
Because these sites have not yet begun to deliver units, the Base Case delivery rates will need to be adjusted regardless of timings for infrastructure delivery. Regarding the key infrastructure that is most likely to initiate large-scale development in this OA, such as the various OOC/ Park Royal transport and utilities and energy packages, there is significant variance in when these may be delivered, and in our updated trajectory we have concluded:

- The infrastructure most likely to initiate development of a site is public transport, given increased connectivity correlates with increased sales values – as such:
    - The first 'wave' of development will likely take place around North Acton Station, where there is an anticipated completion date of 2023;
    - This will likely be followed by an unlocking of sites associated the WLO towards the latter half of the 2020s as this completes;

- As an increasing number of units are delivered, the capacity of the various utilities/ services will likely need to be increased in response to demand. However, the degree of uncertainty around when this infrastructure will be delivered may result in delays to the latter phases of development initiated by the various transport improvements/ developments as capacity is reached or the required services are unavailable.

The above assessment is incorporated in the revised trajectory, alongside a refinement to the build-up of development so it is distributed more towards the latter half of the outlined delivery period, rather than an even distribution from the start on site to completion date.

Figure 5-10 Adjusted delivery trajectory 2019-40 – OOC/ Park Royal



Source: Cushman and Wakefield analysis

5.3.6. Southall

A number of the larger identified development locations are already on site, however there are doubts around some of the later phases of these, meaning there is a risk the homes will be delayed or fewer will be delivered. Southall reaching its housing goals is likely to be contingent on these large-scale developments completing. This is therefore a location in which infrastructure has significant potential to influence both delivery rates and totals.

As the Market Report demonstrates, public transport infrastructure in particular has a notable influence on the values achieved nearby. The associated increase in sales values resulting from improved public transport could increase the viability of later phases of stalled projects, permitting them to recommence. This is of course contingent on the stalling being caused by a financially unviable scheme.

The table below shows the proposed infrastructure projects with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace and scale of delivery.

Table 5-12 – Southall - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
Brentford-Southall Rail Link	2022-27	£60-100m	As highlighted in the Appendix A, the influence of access to the public transport network is significant, increasing desirability (and consequently sales values) of a location and therefore the likelihood of developers commencing – or in this case continuing – construction. Given the presence of some large sites that could potentially see delays in latter phases, the increased desirability that will likely accompany interventions such as these may incentivise developers to continue with delivery that may have otherwise stalled.
Great South West and wider roads improvement works	3022-30	£100m+	Upgrading and redesigning this part of the road network is important given the significant growth across Hillingdon, Ealing and Hounslow, however unless there is an explicit planning requirement to deliver this infrastructure prior to development commencing it is unlikely to unlock or accelerate delivery of homes. Road connectivity is very important to distribution and industrial locations, and the development of improved road access will likely contribute towards the OA reaching its job creation targets.
Utilities			
Southall Decentralised Energy Network	2022- as OA develops	Not yet determined	A district heating network, with large energy centre housing boilers and gas engines producing combined heat and power. Pipe network to Southall East. Assessment and feasibility work has been undertaken and not yet taken forward with funding and delivery approach challenges. A refresh of the need and approach to establish an energy network would need be considered with developers and DNOs.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	

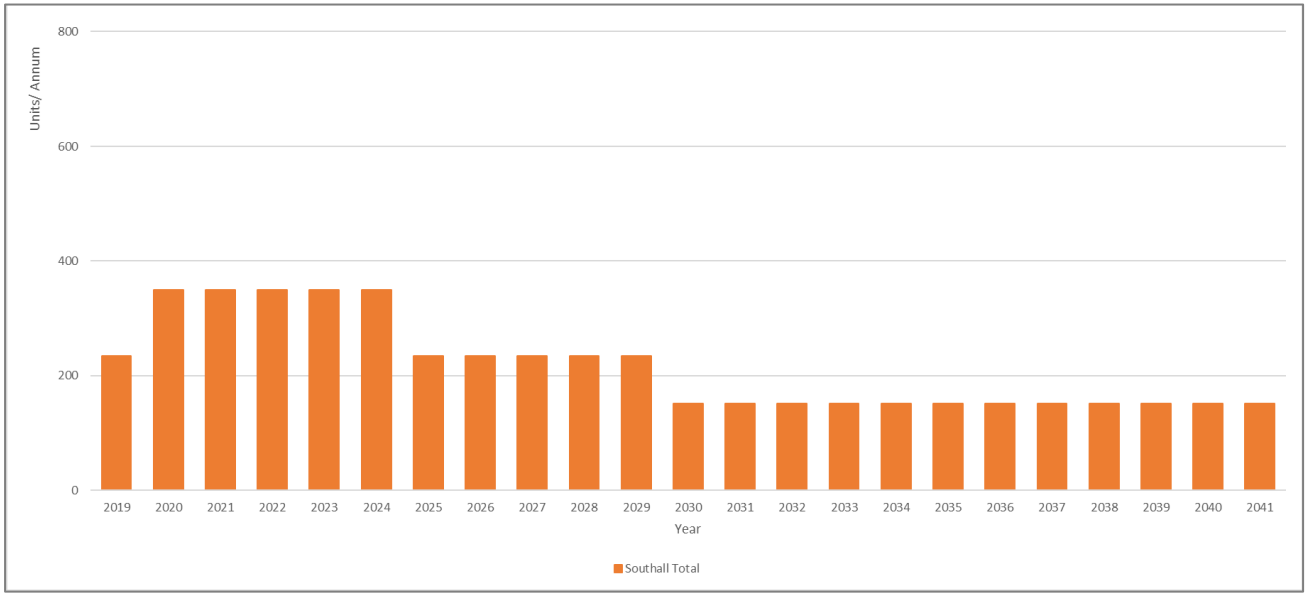
Flood management			
Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
Brent Valley Park improvement and Brent River Walk through Greenford	2021-27	£10m+	This will support the creation of a cohesive location with the green infrastructure and active mode provision adding to the destination and ensuring high quality access for current and new residents and businesses. Whilst these benefits are important in creating a positive environment, they are unlikely to have a significant transformative effect upon the housing market.
Grand Union Canal towpath improvements	2021-30 relevant sections	£20m base estimate (Ealing sections)	Walking and cycling connectivity issues are not likely to present a hard stop that restricts development through physical/ service restrictions, and these proposals predominantly seek to enhance access to these modes of transport. As such, we do not anticipate these infrastructure proposals to have the transformational capacity to increase or accelerate development. However, this does not negate the positive impact green space and reduced reliance on cars can have to an area in other ways.

Southall Waterside (3,475 units) will provide the main contribution of residential space to this OA, and given the scale of the development, the London SHLAA anticipates this project will take until 2041 to complete. Construction has already commenced on Phase 1 (618 units total), with 304 units complete and the remaining 319 currently under construction.

This scheme reaching its full capacity is almost certainly contingent on the upgrades to transport infrastructure, which currently lines up logically with the proposed timescales for the subsequent phases of development. Given the alignment of these infrastructure proposals with the proposed housing trajectory, any delay to the infrastructure being delivered will likely result in a subsequent delay in the delivery of this significant tranche of new homes.

Given the significant increase in homes and commercial space, the lack of clarity around the delivery timescales for the cross-OA utility improvements presents a risk as an upgrade to the existing infrastructure is very likely to be required, however given the extended timescales anticipated for this development the risk to the timely delivery of this project is reduced. Given the relatively low number of sites, and assumed delivery rates in this Opportunity Area in comparison with the Local Authority as a whole, in addition to the relatively even spread of delivery throughout the study period and the lack of transformative infrastructure, our delivery rates for the Opportunity Area would be unlikely to vary from the planning document, as such we have retained the initial Opportunity Area assumptions.

Figure 5-11 Base case delivery trajectory – Southall



Source: Cushman and Wakefield analysis

5.3.7. White City

The most significant residential developments in the area are as follows:

- BBC Television Centre – 432 units of phase 1 completed, Phase 2 comprising 368 units due to commence in 2021.
- Westfield Shepherd's Bush – 1,273 units yet to commence with no firm date for start on site, data for commencement and completion taken from London SHLAA.
- White City Living – Phase 1 is underway, with 294 units yet to complete, Phases 2 & 3 comprise 955 units and are yet to commence development, although part (317 units) of Phase 3 has been brought to market for sale so will likely commence construction in the near future.
- White City Campus: All 373 units yet to commence, speculative completion taken from SHLAA.

This additional detailed site information has been obtained from Molior unless otherwise stated and is therefore more up to date than the Local Plan site identifications. As can be seen there are still over 2,000 units yet to commence, although as the commentary below details, much of the infrastructure to be

delivered is to address future capacity issues around utilities rather than infrastructure that will create a step change that initiates earlier development or accelerates the delivery of units.

The table below shows the proposed infrastructure projects with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace and scale of delivery.

Table 5-13 – White City - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Utilities			
White Centre combined power and district energy network. Heat pipe plant and networks, number of energy stations to be defined.	2021-28	To be determined	A centralised energy centre with land north of Westfield is proposed, suitable for connection to other energy centres to serve the OA. Future connection to the proposed district heating network for expansion should be considered in development schedules. Proposals to construct a heat pipe plant and networks are being assessed and network coverage also needs to be considered in its reach, where additional energy centres will likely be required. This could constrain further sites until capacity and connection responses are determined.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
Green gateways along the A40 and A4 and new local parks at White City and Earls Court	2022-30	£10m+	Whilst development of new green spaces is a significant benefit to a local area, it is unlikely to create the step change in local values that would be required to unlock sites or accelerate development of new homes, and does not typically initiate commercial development.

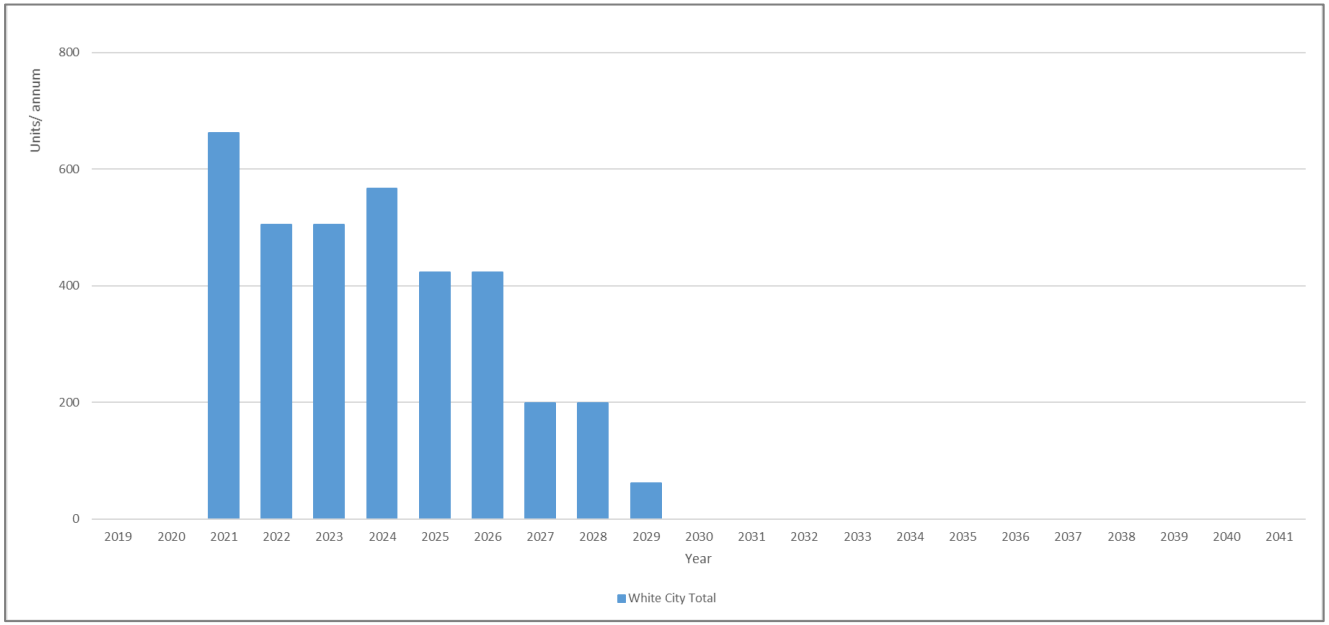
The base case for this Opportunity Area currently shows an early peak for delivery of new homes as a result of SHLAA assumptions that Westfield Shepherd's Bush and BBC Television Centre would be delivering units by 2019 – however as highlighted above the former is yet to commence construction and contributes a significant proportion of the overall anticipated delivery in this OA, and the latter has yet to commence its second phase of delivery.

As such, one would expect this Opportunity Area to be a location in which infrastructure could be used to initiate or accelerate development. However, much of the infrastructure to be delivered is to address future capacity issues around utilities rather than to create a step change that initiates earlier development or accelerates the delivery of units.

Therefore, the updated trajectory will inevitably be delayed compared with the base case as there is little planned infrastructure that will significantly accelerate development, and there have been real-world delays compared with the base case that have manifested themselves in the updated trajectory, as follows:

- 35-52 Goldhawk Road, 208 units: Delayed to reflect real world delays; construction period decreased, and therefore number of units per annum increased as previously at 35 units/ annum, which is very low.
- White City Living, 1,249 units: Delivery rates slowed, and construction period extended to reflect real world delivery schedules.
- Westfield Shepherd's Bush, 1,347 units: Construction delayed to account for real world delays.

Figure 5-12 Adjusted delivery trajectory 2019-40 – White City



Source: Cushman and Wakefield analysis

5.3.8. Earls Court and West Kensington

The majority of this development is anticipated to take place on two major sites – the regeneration of Earls Court (full planning for 5,647 residential units, achieved in 2011) and Lillie Square (full planning permission for 808 residential units, achieved in 2011).

Lillie Square is on site and development has progressed significantly since planning permission was secured and therefore new strategic infrastructure provision would be unlikely to have a significant effect on the final totals or speed of delivery. However, consideration of the infrastructure requirements for Earls Court is likely to be required and could be influential on both the final totals for this Opportunity Area as well as the speed at which these homes and jobs are delivered as this is the major source of residential and commercial delivery in this Opportunity Area, and it has yet to commence on site with the developer holding off on delivery for 'market reasons'.

The table below shows the proposed infrastructure projects with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace and scale of delivery.

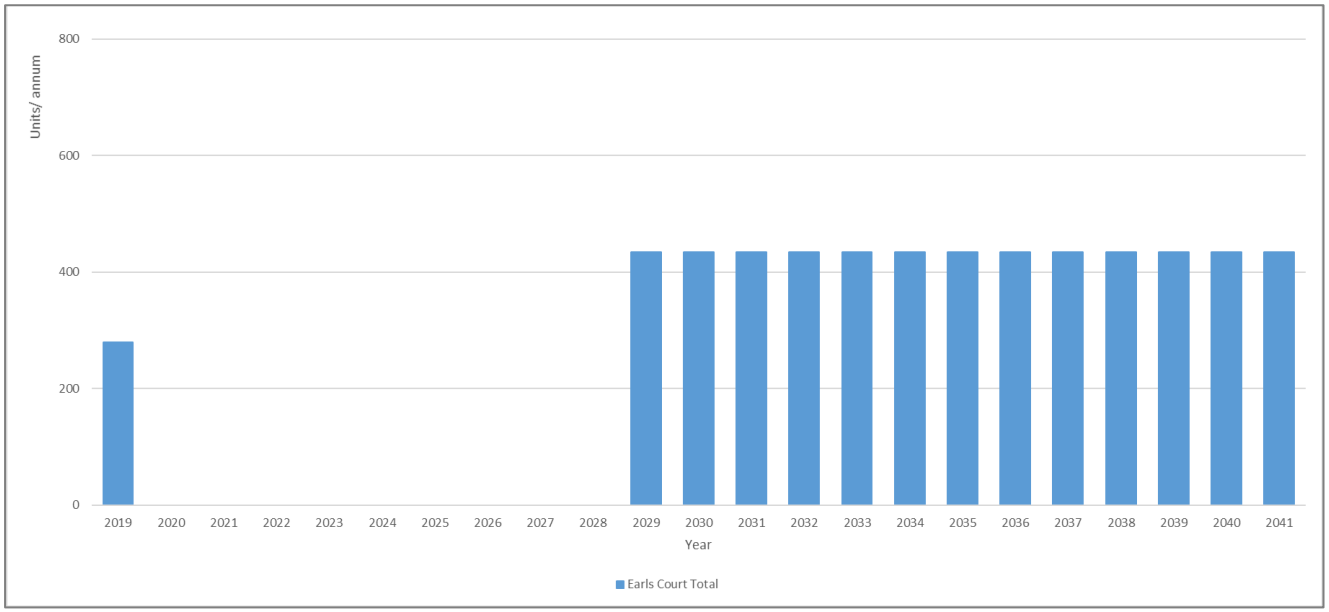
Table 5-14 – Earls Court and West Kensington - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
Freight Transformation	2022-35 1st phase for 2024/5	£50m+	Emerging technology options for moving freight goods between industrial and consolidation centres, reducing road traffic, these will likely encourage development of additional job-creating elements in this location.
Utilities			
Earls Court and West Kensington decentralised energy network	Tbc, as OA schedule emerges	To be determined	Given the status of the developer as a majority landholder in this OA, in effect a 'master developer', this infrastructure would likely be completed by the developer in collaboration with an energy provider, as such it is unlikely to materially affect delivery rates once the developer has decided to commence construction.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
Green gateways along the A40 and A4 and new local parks at White City and Earls Court	2022-30	£10m+	Whilst development of new green spaces is a significant benefit to a local area, it is unlikely to create the step change in local values that would be required to unlock sites or accelerate development of new homes and does not typically initiate commercial development.

The anticipated delivery of units is concentrated into one period across which the Earls Court master consent is delivered. Given the fact that this is a significant masterplan being delivered by a single developer, much of the infrastructure – particularly the on-site utilities and walking routes – are likely to be delivered by the developer whilst constructing the remainder of the site, with little infrastructure has been proposed that the developer may wait for in order to make their site more financially viable.

As such it is difficult to see how the proposed infrastructure to date will incentivise the accelerated delivery of units at this site, and given the sheer number of units, a five-year construction period – which is approximately 900 units per annum – is challenging for a single site with a single landholder drip-feeding units to the market. As such our adjusted delivery trajectory has extended the construction period to the end of the study period – from 2034 to 2040.

Figure 5-13 Adjusted delivery trajectory 2019-40 – Earls Court and West Kensington



Source: Cushman and Wakefield analysis

5.3.9. Hayes

The majority of the sites identified by the Hillingdon 5 year land supply document are on site and most are anticipated for completion prior to 2022. These are unlikely to be significantly influenced by the allocation of additional strategic infrastructure for delivery in the short term.

However, there are several sites with longer development periods in some cases extending into 2023/24, with the Nestle sites (1,500+ units), Fairview Business Centre (260 units) and several other sites anticipated to be delivering units into 2023/24.

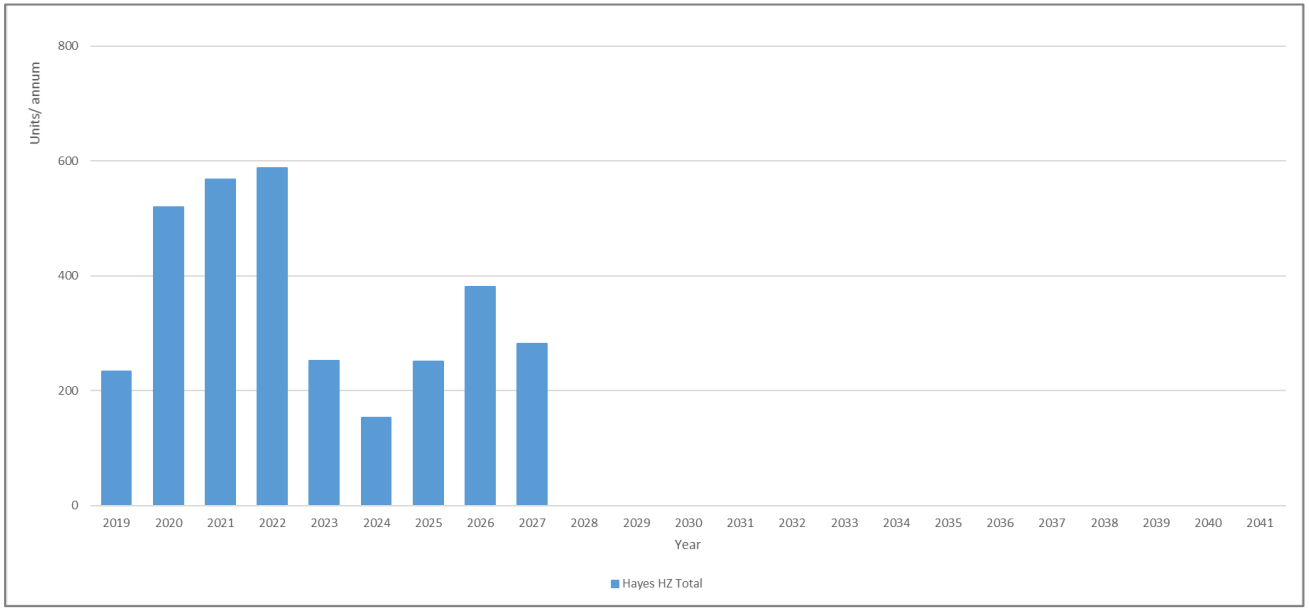
For those sites where construction is yet to commence, some of the infrastructure identified will help to unlock or accelerate delivery. Beyond 2024 there is no allocated development at present, meaning longer term infrastructure investment may only serve existing sites. However, the review of the Local Plan has the potential to allocate more housing within and around the Hayes OA. Therefore, new longer term infrastructure may well also result in accelerated/increased density of sites that are not yet allocated. The following seeks to summarise those infrastructure proposals we envisage being most likely to influence the delivery of new units within the Hayes.

River Colne and Crane Valley Green Grid improvements will improve access from residential areas to the river and to walking and cycling routes, as well as to mitigate the potential impact of HS2 nearby. These benefits are important in creating a positive environment in which development can occur. Identified flood mitigation projects within Hillingdon and Hayes will secure the future flood mitigation of the area. The expansion of a site heating network at the Nestles site to the wider area, and supported by an energy centre, will support the meeting of zero carbon objectives.

Much of the anticipated housing development is due to complete in the short term, with an additional delivery spike between 2022 and 2024, during which sites such as 233-236 Nestles Avenue (457 units), Crown Trading Estate (197 units) and Fairview Business Centre (260 units) are expected to commence and complete units. It is these sites that we would expect to be affected by any infrastructure that needs to be delivered[283]. If these sites' commencement dates are intrinsically linked to the completion of the Hayes Electricity and District Heating Network, for example, it is likely that the earliest these sites will be delivered will be concurrently with the completion of this infrastructure, shifting the peak delivery that is currently between 2022-24 out to 2025-26. Uncertainty around the delivery dates for these elements of infrastructure mean we have adjusted the base case to reflect this uncertainty, and this scenario is presented below:

[283] Hillingdon 5-year Land Supply Document

Figure 5-14 Adjusted delivery trajectory 2019-40 – Hayes



Source: Cushman and Wakefield analysis

5.3.10. Great West Corridor

The London Plan includes the addition of the Great West Corridor as an Opportunity Area, assigning the area housing and job targets of 7,500 and 14,000 respectively. This is however subject to change with the finalised, adopted version of the New London Plan.

Our understanding is that there are currently broad locations identified within the Great West Corridor Masterplan capable of contributing c. 7,150 homes before 2035. The majority of the identified development locations are not specific sites at this stage, rather they are proposed development areas that may contain a single – or a number of – developable land parcels. We have extrapolated information from various sources such as Molior and the Great West Corridor Masterplan (2019) in order to identify sites that will likely be included in the OA.

Of particular importance for the development of the Great West Corridor is the West London Orbital station at Lionel Road, which is one of the pieces of infrastructure identified in the New London Plan as being capable of initiating development.

The table below shows the proposed infrastructure projects with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace and scale of delivery.

Table 5-15 – Great West Corridor - Development Impacts of Infrastructure

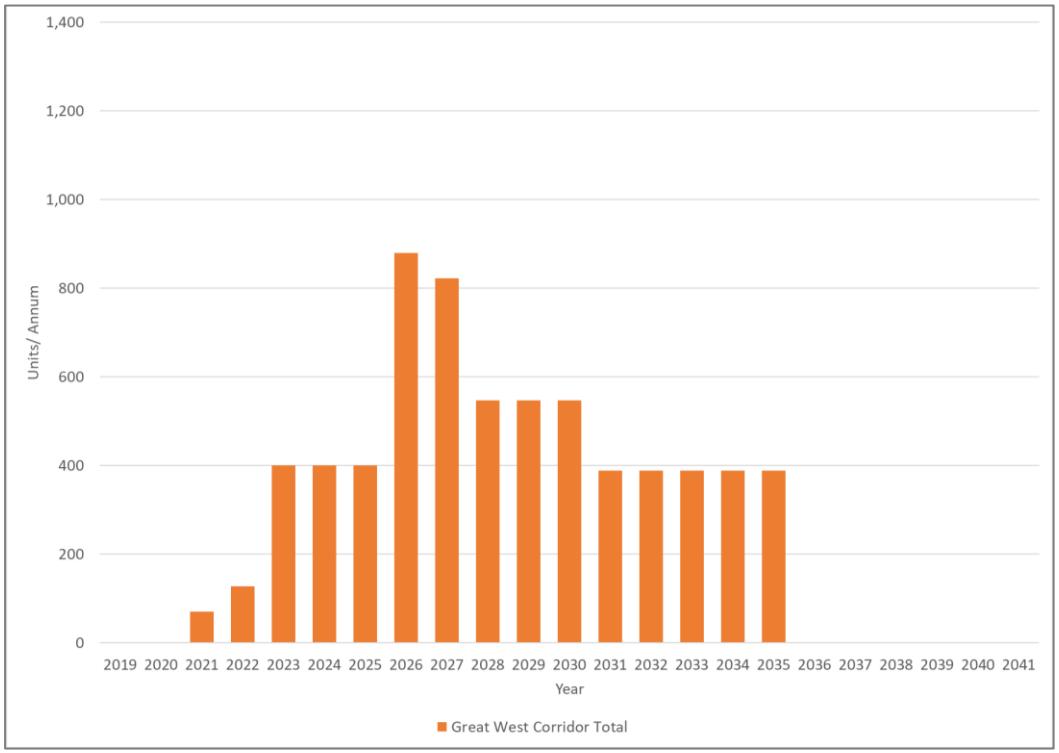
Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
WLO	2024-29	£250-500m	A number of stops along the some of the shortlisted WLO routes will fall in and around the Great West Corridor OA, with a potential new station at Lionel Road significantly increasing the connectivity in the OA. Brentford Station is also in the Great West Corridor and will be connected to the WLO. The WLO dependent development assessment[284] estimated 4,289 WLO-dependent homes in Hounslow, , some of which will be likely be developed in the GWC.
Brentford – Southall Rail Link	2022-27	£60m-£100m	A direct interchange to other parts of the WLA area including the Southall OA, in addition to the Elizabeth Line, without having to travel into central London first. This increased connectivity with the rest of the WLA, as well as London, Reading and the South East should allow the OA to establish itself as a more significant centre, capable of increasing the viability and therefore capacity of commercial uses in the area.
A406 Corridor Improvements	2022-35	£100m	The A406 has extensive private and freight vehicle traffic and congestion, alongside freight. This corridor is a critical link, and in places a barrier or development challenge according to the Brent local implementation plan and the Ealing SIDP input (transport long list). As such, and given the road is used by both commercial and residential traffic, this infrastructure is likely to prevent delivery of residential and commercial once deemed to be at capacity, and therefore these improvements will unlock the remaining units/ jobs.
Express bus services from GWC to Kew, Gunnersbury, Osterley, using A4 as BRT.	2023-27	£50m+	The rationale for including bus network improvements is to address areas of low PTAL values, providing increased accessibility to stations as interchanges. Whilst this is important in integrating the OA with its surrounding areas, it is unlikely to be a major factor in unlocking or accelerating delivery of development on the OA sites themselves.
West London cycling network – Cycle superhighway 9 sections of relevance alongside linkages between local centres	2021-30	To be determined	Whilst the improvement of the cycling network has numerous benefits such as improving access to stations in areas with lower PTAL, reduction in the need for car parking provision at residential and commercial developments and increasing air quality, in isolation it is unlikely to create a significant enough change to initiate development above and beyond the rate that one would anticipate should the cycling infrastructure not be delivered
Freight Transformation potential	2024- First phase to 2024/5	To be determined (private sector led)	Emerging technology options for moving freight goods between industrial and consolidation centres, reducing road traffic, these will likely encourage development of additional, job-creating, industrial units in this location, elevating it as one of London's important industrial/ distribution hubs.

[284] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020)

Utilities			
Great West Corridor energy centres and distribution	2022-30	To be determined	Rooftop PVS and heat pumps to be utilised alongside the network to provide low carbon energy from wider Hounslow area. These are likely to be delivered on a site by site basis by the developer, and as such will not restrict delivery.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
Critical Drainage Mitigation: Overground, Kew Bridge increase capacity	2022-30	To be determined	Increase capacity and implement flood plan. More information required for how these may impact development. These CDAs are also being reviewed.
Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			
Improvements to Boston Manor Park. Improve links for walkway and cycling through River Brent, local parks and to Ealing.	2022-30	To be determined	Whilst development of new green spaces is a significant benefit to a local area, it is unlikely to create the step change in local values that would be required to unlock sites or accelerate development of new homes and does not typically initiate commercial development.

The significant early peak in the Base Case delivery model is in part a result of the Great West Corridor Masterplan assumptions for the Brentford Stadium Quarter, which predicted a 2,899 unit scheme with an anticipated start on site of 2019 and completion in 2024 – a per annum delivery rate of c. 480 units per annum.

Figure 5-15 Base case delivery trajectory 2019-40 – Great West Corridor



Source: Cushman and Wakefield analysis

In practice this development site will come forward less rapidly and with a lower total number of units than initially anticipated. Firstly, some of the units have likely been lost to other development sites that are now individually named instead of forming part of a wider 'quarter', and secondly the following market-led changes to the development trajectory have taken place:

- Phase 1 – 487 units: Currently on site, with completions running between Q2 2021 to Q3 2021
- Phase 2 – 253 units: Currently on site, with 180 units anticipated to complete in Q2/3 2022, and the remaining 74 units completing in Q1 2023
- Phase 3 – 275 units, yet to gain full planning permission.

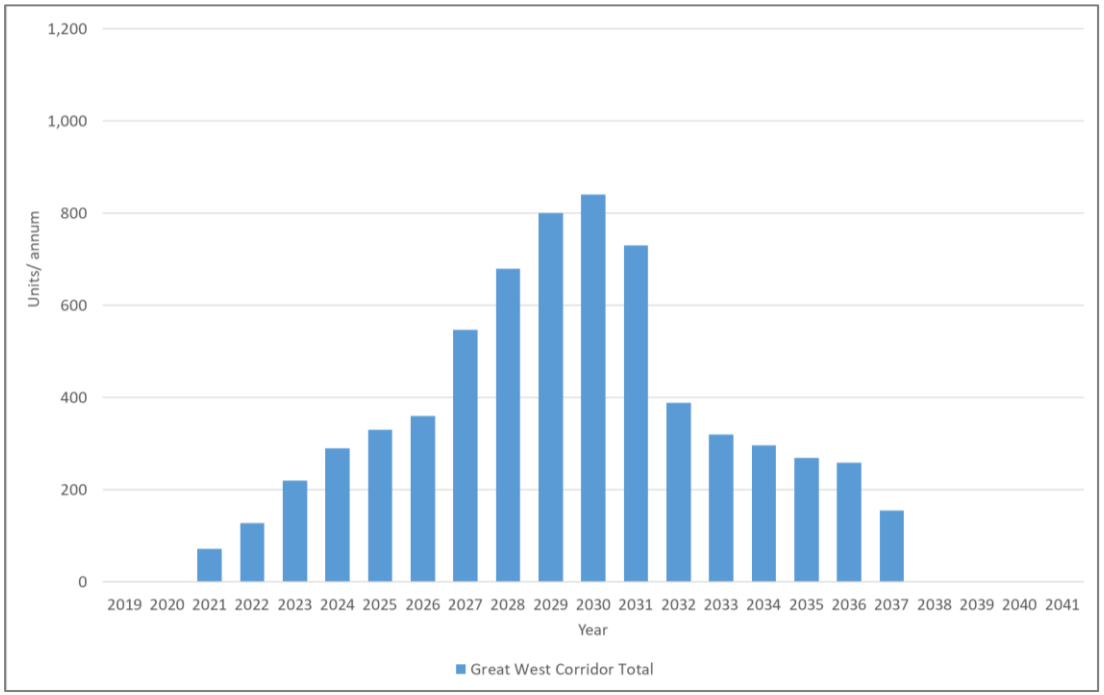
Whist there is significant residential growth throughout the OA, the principal residential development hub for this OA is around Kew Bridge and Gunnersbury Stations. The former is not identified as being upgraded as part of the infrastructure package influencing this location, however the latter is considered to be a

key interchange for access to central London and the remainder of the WLA area that is threatening to reach capacity in the near future. As such, this station capacity upgrade – currently earmarked for delivery in 2025-30 – could have a significant impact on the progress of other developments in the location, which include:

- B&Q Chiswick – 258 units expected to commence 2020 – 2025, planning application submitted
- Citroen Brentford – 441 units, with planning, SHLAA anticipated delivery in 2020 – 2025
- 1-4 Capital Interchange Way – 420 units, with planning, anticipated delivery in Local Plan between 2019 – 2024 but this has been missed.

Based on this information and analysis, we have extended the developments out along the Study Period to account for Gunnersbury Station coming forwards in 2025, and the effect this could have on some of the sites that are yet to commence development, and addressed the market led changes to the SHLAA/ Local Plan profile as highlighted above.

Figure 5-16 Adjusted delivery trajectory 2019-40 – Great West Corridor



Source: Cushman and Wakefield analysis

5.3.11. West of Hounslow

The Hounslow Local Plan Review proposes housing and job targets of 10,300 and 13,000 respectively for the West of Hounslow area, and 8,600 and 6,350 without Heathrow Gateway. The West of Borough Plan will come forward without Heathrow Gateway. Hounslow have provided information that highlights c. 3,000 homes on large sites in the West of Hounslow area that are currently under construction and identifies other large sites across the area that are capable of delivering an additional 12,200 units.

Given the considerable size of the overall West of Hounslow area and the significant potential for delivery of new homes above those currently on site, it is likely that appropriate infrastructure investment will be capable of initiating, accelerating and increasing the delivery of new homes through the study period. It is important to note however that this Local Plan Review is partially contingent on the delivery of the new runway at Heathrow Airport to initiate development and the status of this piece of infrastructure is currently unclear.

The table below shows the proposed infrastructure projects with commentary regarding how important we consider the infrastructure delivery to be in potentially accelerating the pace and scale of delivery.

Table 5-16 – West of Hounslow - Development Impacts of Infrastructure

Proposal	Suggested/ likely delivery	Estimated cost	Development impacts
Transport			
WLO	2024-29	£250-500m	Hounslow Station will form the final stop on some of the short-listed WLO routes. The increased connectivity to the wider WLA area as well as central London that the WLO brings will likely initiate additional development in this location, as well as accelerating large-scale development that has already commenced. The WLO dependent development assessment[285] estimated 4,289 WLO-dependent homes in Hounslow, some of which will be likely be developed in the West of Hounslow. Importantly due to the size of the West of Hounslow area, most of this effect is likely to be seen in the station surrounds, and the WLO's influence will fade when moving away from the station.
Southern Rail Access to Heathrow	2030-40	To be determined	New Southern Rail Access to Heathrow with a station at Bedfont will increase PTAL across the Great West Corridor area and is of significant impact for development at Heathrow Gateway as part of the West of Hounslow Local Plan housing delivery. The increase in connectivity will have a particular effect in the Bedfont station surrounds and support development coming forward.
Great South West and wider roads	2022-30	£100m+	These works seek to address capacity issues across the road network resulting from increased development. As they are widespread and influenced by a multitude of development locations, it is unlikely that the West of Hounslow development area will be hindered should these improvements not take place.

[285] *West London Orbital: Economic Development Narrative – Technical Report,* Steer Arcadis (2020)

			From a job creation perspective, the increase in connectivity to the M4 J1-3 smart motorway could have a significant influence, as connectivity into London, alongside rapid access to arterial routes out of London, are vital particularly for uses such as distribution.
West London cycling network – Hounslow superhighway sections and local centre links, with future link to Heathrow	2021-30	To be determined	Whilst the improvement of the cycling network has numerous benefits such as improving access to stations in areas with lower PTAL, reduction in the need for car parking provision at residential and commercial developments and increasing air quality, in isolation it is unlikely to create a significant enough change to initiate development above and beyond the rate that one would anticipate should the cycling infrastructure not be delivered.
Express bus routes Hounslow centres to Heathrow	2022-	To be determined	As above, this would positively improve PTAL between Hounslow's centres e.g. Brentford and Feltham centres
Utilities			
Hounslow renewable energy generation	2022-2028	£8m+	Two solar farms, at the Eastern Perimeter of Heathrow, comprising private wiring direct to the Airport, and a Western International Market substation linkage. Unless the latter of these substations is explicitly serving commercial or residential development sites to make up an energy shortfall in the area, this infrastructure is unlikely to unlock or accelerate development.
Full fibre broadband provision	tbc	Provider	Likely to be installed to sites in collaboration with developers, this is key infrastructure but at a site by site level unlikely to affect delivery.
High quality speed 5G wireless connectivity	tbc	Provider	
Flood management			
Critical Drainage: M4 Cranford and North Hyde	2022-30	To be determined	Increase capacity and implement flood plan. More information required for how these may impact development. These CDAs are also being reviewed.
Feltham Flood Alleviation Project	2021-	To be determined	This project is currently in inception. Should it be targeted towards protecting what could become development land from flooding then it will likely unlock additional homes and/ or jobs.
Strategic area SuDS	2022-34	To be determined	Strategic SuDS intended to reduce runoff onto roads, falling into two main categories – those in developments and those in public open spaces. The former type is likely to come forward on a site by site basis and as such we would not expect it to affect either the capacity or the pace of development. The latter will either be required in response to the effect of a new development – in which case that development will still need to contribute – or it will not be as a result of development in which case it is unlikely to be a hindrance to development.
Green infrastructure			

Improve access within River Colne and Crane Valley Green Grid	tbc	To be determined	Development of new green spaces is a significant benefit to a local area and addressing access deficiencies and ensure capacity to meet the scale of new residents into the future. It is unlikely to create the step change in local values that would be required to unlock sites or accelerate development of new homes and does not typically initiate commercial development.
Feltham development of new local parks	2022-35	To be determined	

The West of Hounslow area has a significantly different delivery base case when compared with the other Opportunity Areas analysed for this study as it instead encompasses a far larger portion of land, with 20 different sites contributing to a total anticipated delivery of over 11,000 units over the course of the study period. This makes the delivery rates more consistent and consistently high, with there frequently being nine sites anticipated to deliver units at any one time. Notably, there is a significant amount of development land identified that can be delivered towards the end of the study period when compared with the other OAs, meaning there is a far higher likelihood of sites being influenced by the intended or actual delivery of strategic infrastructure, although this effect may be somewhat negated by the significant size of the West of Hounslow area, with the efficacy of each piece of infrastructure reduced as it does not access as many development sites.

Beyond the new runway at Heathrow Airport, which is excluded from this report, the main piece of infrastructure that is likely to have a significant effect on the delivery of units is the WLO – there are two stops that fall in proximity of the West of Hounslow Area, Hounslow Station and Isleworth. We would expect these two stations to be the focal points for much of the development that takes place within the West of Hounslow Area, and several sites of significant size are located in close proximity to these two stations:

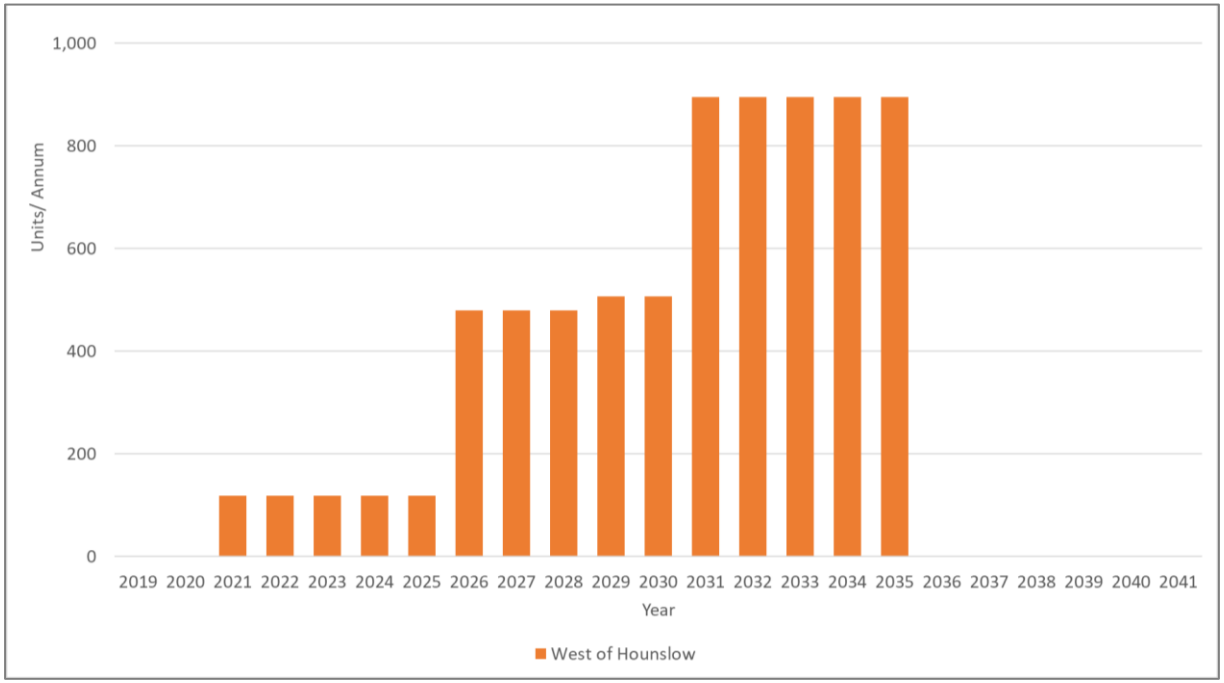
- Hounslow Bus Garage, 830 units: Delivery estimated between 2025 – 2030,
- Hounslow Cavalry Barracks, 1,000 units: Delivery estimated between 2025 – 2035,
- West Middlesex Hospital, 500 units: Delivery estimated between 2025 – 2035.

No market information is available on the progress of these sites, with none appearing to have progressed, therefore their development could be initiated by the delivery of the new stations, particularly given the estimated timescales are later in the study period.

- Hounslow West Station, 360 units: Delivery estimated between 2025 – 2030, an announcement made by the developer (A2Dominion & TFL) in February 2020 indicated an intention to increase to 400 units. Close proximity to existing Hounslow West station (Piccadilly Line) likely negates the importance of the WLO station development at this site.
- Hounslow Civic Centre & 88 Lampton Road, 940 units: Delivery estimated between 2019 – 2024, gained full planning permission for phase 2 in October 2020 having completed 178 affordable units in Q1 2019, and therefore will likely be delivered to the estimated timescale regardless of new infrastructure.

Given the high level of the information available and the significant size of this location, we refer to a base case trajectory for this Opportunity Area as below.

Figure 5-17 Base case delivery trajectory 2019-40 – West of Hounslow



Source: Cushman and Wakefield analysis

6. Funding and Delivery

6.1. Introduction

This section provides a strategic perspective on the funding and delivery options to support the growth and associated infrastructure identified for West London in the preceding chapters. It should be highlighted that this represents a 'snap-shot' in time given the dynamic nature not only of the forces shaping the definition of future infrastructure needs but also how the funding and fiscal environment is changing markedly.

It is important to note that the timing of both planned development and the infrastructure needed to enable the delivery of development has a significant bearing on funding opportunities and prospects. Consequently, issues of funding and delivery should be considered from short, medium and long-term perspectives. Also critical to the assessment of funding options is the distinction that should be made between 'upfront infrastructure' and 'supporting infrastructure'.

- **Upfront infrastructure** tends to include hard infrastructure items that are critical in terms site delivery and wider place-making. These infrastructure items have linked site delivery dependencies and generally include physical infrastructure in early stages of sequential development. Most of the infrastructure of this kind belongs in the essential or required categories.

- **Supporting infrastructure** tends to include more soft contribution based items such as health, leisure, education, public realm enhancement etc. Most of the infrastructure in this category belongs to important, required or supportive categories.

The funding and financing options that have been considered can be summarised into the following categories:

- **Grant Funding:** The funding streams that have a reasonable likelihood of being secured for specific infrastructure types either through central government grant funding, GLA sources, agreed S106 agreements or other mechanisms channelled through local authorities.
- **Existing Income Streams**. This represents the funding streams that may be generated through the delivery of development that are currently available to local government to help fund infrastructure.
- **Alternative Income Streams:** These are income streams which are either not commonly utilised for infrastructure or are not currently available to local government for funding infrastructure. However, they have the potential to unlock significant amounts of investment should a new funding deal be agreed with central government. A medium to long term time perspective should be taken in considering these mechanisms.

This section also considers critical delivery issues and priorities for different infrastructure types.

6.2. Grant funding & existing infrastructure funding mechanisms

6.2.1. Residual Land Value of publicly owned land

The investment in infrastructure will help to unlock the development potential across West London and as such have a potentially positive effect on the current land values across the area. Currently the land ownership is fragmented and while the constituent local authorities own land across West London, a large proportion of the land is currently privately owned. The Greater London Authority (GLA) also has land holdings within the area. At a theoretical level, the net uplift in land value on public sector land value coupled with a proportionate contribution from uplift on private sector land value could be captured and directed towards the costs of essential infrastructure. Some of the potential mechanisms for doing do are discussed below.

6.2.2. Community Infrastructure Levy (CIL)

CIL is a mechanism for collecting development contributions in an area in order to fund a wide range of infrastructure items, based on a tariff structure. Introduced by the Labour Government, CIL is a mechanism for collecting contributions from new development for infrastructure. Previously contributions from new development could only be secured by Section 106 ('S106') agreements, designed to address impacts directly arising from the development.

CIL is intended to work alongside planning obligations, and to pool development contributions in an area in order to fund a wide range of infrastructure items – which may include roads, other transport facilities, flood defences, schools, medical facilities etc. CIL charges are based on a tariff structure adopted by each local authority – with evidence to date from adopted charging schedules suggesting fairly significant variation in the level of CIL that is being set, as rates have to be set by reference to local development viability.

There is a powerful imperative for setting CIL, where pooling restrictions for non-site specific infrastructure have now been abolished. In London, the Mayoral CIL has since 2012 proved an effective mechanism for securing resources for implementation of Crossrail.

CIL has not been generally perceived as being an especially equitable, efficient, and transparent system of securing developer contributions for local infrastructure.

The CIL Review Group identified several flaws in the operation of the levy[286]. For CIL to become an effective mechanism for capturing development values for the provision of local infrastructure, the Group recommended reforms to address two key challenges:

- CIL has proved to be overly complex with a need for the extensive range of exceptions need to be reduced.
- To be effective, there needs to be greater certainty that the infrastructure associated with development is actually delivered at the appropriate time, often prior to development commencing.

In setting the CIL rate Councils' have allowed a significant margin of error in order to avoid making development unviable or create unattractive places. Councils have often been challenged strongly by the development industry, resulting in lower rates being set than otherwise would be the case. This has meant that the approach may be failing to capture sufficient funds for the intended purpose.

Furthermore, CIL was not set up to provide infrastructure owners and providers with a mechanism to require cooperation from the local authorities in seeking contributions for strategic infrastructure. There are particular issues in Greater London, where planning legislation does not allow establishment of joint committees that could levy a single pan-West London levy. The only real scope for significant use of a CIL mechanism for strategic infrastructure would be to develop a collaborative CIL specifically for the purposes of sourcing funding contributions for the project in question (as used for the Elizabeth Line), though each borough would need to do a separate, but coordinated CIL through powers beyond the borough level, with political agreement across the authorities in order to ring-fence funds for any given scheme. Liaison with the GLA and Government would also be required to ensure that this is a realistic option from a statute point of view. The strength of the business case, particularly the anticipated development, regeneration and local economic impacts would be critical to the viability and suitability of introducing a strategic CIL approach for any scheme.

Going forward, the CIL system is also subject to potential change as proposed in the Planning White Paper (August 2020) which is considered below.

6.2.3. Section 106 Agreements

Local authorities can levy charges on new development planning obligations under the Town and Country Planning Act 1990 (as amended). These are agreements with a developer (or in some cases unilateral undertakings by developers) to provide contributions to offset negative impacts caused by construction and development. The contributions (e.g. provision of affordable housing) must be relevant to the development they relate to; necessary to make a development acceptable in planning terms; and fairly and reasonably related to the scale and kind of the development, with the main purpose of addressing the impacts that a particular development might have in terms of contributing

[286] *A New Approach to Developer Contributions, A report by the CIL Review Team* (October 2016)

to wider infrastructure needs. They can relate to a wide range of infrastructure including highways, but are not specifically designed to capture uplift in land value. However, it is seen as a tool to raise funding for infrastructure and services that would make a development acceptable to a local community that otherwise wouldn't be.

The House of Commons HCLG Committee Report on Land Value Capture discusses ways in which to improve Section 106 to better capture uplifts in land value[287]. These focus around four reforms: improvements to the viability process, enhancing the competence of local planning authorities, a greater use of Compulsory Purchase Order (CPO) powers, and a minimum accepted level of developer contributions. The Committee considered that Section 106 has been successful in generating significant revenue for infrastructure and affordable housing and that it should be retained as part of a wider package of land value capture methods. The Government has made several important changes through the revised National Planning Policy Framework (NPPF), in particularly around transparency in the viability process and is considering further reforms as part of its "Planning for the Future" white paper proposals (see below)

However, using s106 as a route to provide infrastructure owners and local authorities with funds for strategic infrastructure, it should be highlighted that:

- Local authorities that expect to raise higher revenues from s106 agreements should ensure they have agreed local plans that provide clarity and certainty to developers. For strategic infrastructure in West London, this would require a collective approach across local plans or the use of a common infrastructure delivery strategy – the kind of approach suggested by this SIDP.
- Current resourcing and capability of local authorities is challenged which places them at a distinct negotiating disadvantage compared to that typically available to major developers (including legal advice). This includes the need for local authorities to be better equipped to challenge viability evidence and to negotiate robustly against unreasonable efforts seeking to remove or significantly reduce the scale contributions (including attempts to renegotiate down obligations as one moves closer to scheme delivery).
- Local authorities should consider using their existing CPO powers to enforce local plan policies and agree to transfer funds raised in accordance with this policy to infrastructure owners and providers to contribute to the costs of any given scheme.
- The CIL Review Group recommended that a Local Infrastructure Tariff should be introduced, with a minimum level of developer contributions that cannot be negotiated away through the viability process (rejected by Government). Though this could be resource intensive and complex. The Government is considering this kind of approach as part of its planning reforms.

Contributions from developers or landowners benefiting from development enabled by grant of planning permission are typically limited to mitigating the impact of development and works directly relating the development in question. Moreover, for infrastructure owners to seek contributions towards the wider costs of the scheme, this intention would need to be embedded in local plans or a cross boundary infrastructure delivery strategy linked to local plans. Only local planning authorities can enter into (or be parties to) section 106 agreements.

This raises the critical issue of timing and foresight when it comes to developing a value capture strategy for any given infrastructure scheme. Expectations that developer contributions are intended to form a central part of infrastructure funding plans requires consideration and testing at the early stages of local plan development. This long-term approach in planning for value capture would align with the goal of embedding a relevant policy or mechanism at the early stage of the Local Plan process.

It should be highlighted that even with the benefit of good long-term planning, many development enabling infrastructure schemes will impact on more that local authority area, particularly in complex urban locations such as West London. Current powers would require separate (and collective) organisation with each local authority which represents a clear risk and constraint to the effective use of value capture mechanisms.

[287] Land Value Capture, House of Commons (2018). Land Value Capture (parliament.uk)

6.2.4. Planning White Paper Infrastructure Levy Review

As highlighted above, the existing Community Infrastructure Levy is under Government review. The Government's Planning White Paper "Planning for the Future" was published for consultation in August 2020, ending in October 2020, setting out plans to transform the planning system. A response to the consultation is awaited at time of writing, with the prospect of legislation being introduced later in 2021. .

The national infrastructure levy proposed in the white paper would replace both S106 agreements and Community Infrastructure Levy (CIL). The Government considers that looked at nationally, CIL has had limited success, with only half of Local Planning Authorities (LPAs) adopting a CIL Charging Schedule. This is at least partially due to poor development viability in many areas particularly in the north of England. It is expected by Government that the new levy would generate more revenue than the existing system and deliver more on-site affordable housing. The new levy would be mandatory and set nationally as a value based flat rate charge.

The levy would be:

- Charged as a fixed proportion of the development value above a set threshold. The minimum threshold is said to protect low viability developments.
- Paid at the point of occupation to help developers' cash flows.
- Local authorities would be able to borrow against the Levy to invest in key enabling infrastructure but equally it could be used by councils to support existing services and reduce Council Tax.
- On-site affordable housing could be off-set against the levy.
- The London Mayor's CIL and Combined Authorities CIL may be retained.

The most notable challenge with a nationally set levy of the kind proposed by Government is that it would be difficult to reflect the viability of specific developments which may have to address abnormal costs such as ground conditions and other external challenges. Moreover, for market reasons land values vary across the country and within regions. It has been suggested that the levy could be set to reflect regional markets and prevailing land values in those areas, but it is difficult to see how it could reflect site specific issues and may favour developers of greenfield schemes over brownfield development which clearly raises implications for metropolitan areas such as West London. It is possible that developers will further focus housebuilding activity in high land value areas as the levy would further reduce profit margins in low value areas. This would be contrary to the primary objective of levelling up the economy. An alternative option would be for Councils to set the levy locally reflecting their market conditions. However, such an approach may result in the same challenges which have faced CIL.

A nationally-set infrastructure levy could support developers resist any further negotiation locally given S106 agreements would be abolished. This could present situations where local authorities and other statutory bodies wish to refuse planning permission because the levy does not generate sufficient revenue to pay for critical infrastructure that supports sustainable developments and off-sets the transport and environmental impacts of development.

Most recently, ministers have indicated that the infrastructure levy will be set locally.

Additionally, there is the risk that local authorities do not use the Levy revenue to support investment in supporting infrastructure given other demands on the levy. Certainly, infrastructure owners could not necessarily rely upon the levy to support new investment and any additional investment could only be achieved by way of direct commercial agreements with landowners/developers which places a significant burden on local authorities and infrastructure owners.

The levy could support investment in strategic projects provided that local authorities across West London agree to fund or part fund those schemes and claw back contributions as the levy is paid by developers. They would need to prioritise the use of the levy in relation to an agreed infrastructure delivery strategy and adopted Local Plans. Almost inevitably there will not be enough levy to support all infrastructure required to enable growth. Local authorities may also be nervous to borrow against

future payments of the levy which are only payable upon completion. Even if payments are made as phases of schemes are completed it will be a number of years before infrastructure investments are repaid. The issues of cash flow could therefore pass from the developer to the local authority.

It may be that a national infrastructure levy will generate significant additional funds that may support the delivery of strategic infrastructure investment priorities, but further detail and clarification is required from Government. Further, the levy is also intended for affordable housing delivery and to part-fund planning departments and this may limit the funds that are allocated to infrastructure.

6.2.5. Home Building Fund

The Home Building Fund is a £4.5bn Homes England fund offering both Development Finance and Infrastructure Finance. The Home Building Fund is available to the private sector for both small and large sites, with loans of between £250,000 and £250m available for applicants.

Typical terms for the Development Finance are c.5 years, and up to 20 years for the Infrastructure Finance. Applications for this funding stream are open; Infrastructure Finance can be drawn down up to March 31st, 2021 and Development Finance can be drawn down up to March 31st, 2023.

6.2.6. Land Assembly, Small Sites and Accelerated Construction Funds

The GLA has secured £486m of funding from Government to help unlock and accelerate housing delivery in London through land assembly, infrastructure investment and provision of gap funding, with the terms of the loan being a delivery target of 8,000 housing completions in London by 2030. Any recoverable investment or receipts generated by the programme will be available for recycling by the GLA for further investment, and therefore priority will be given to investments that are recoverable.

The purpose of the collective funds is to assist third party entities requiring financial support to unlock sites constrained by complex land ownership issues. The Accelerated Construction Fund and Small Sites Fund can be used for land acquisition, development finance, infrastructure investment and land remediation. The GLA will work to inject financial support towards the cost of land and infrastructure for schemes where additional affordable housing may be possible or where acceleration of delivery of that affordable housing may be achieved.

The GLA was required to commit 25% of the funds to London projects within the financial year 2018-19, however there is no explicit end to the application period once this initial requirement was achieved.

6.2.7. Brownfield Fund

The Government announced its intention to back brownfield sites for development via a new £400m brownfield fund in September 2020. Further details of the nature of this fund are currently unavailable.

6.2.8. Housing Infrastructure Fund (HIF)

HIF was a £5.5bn fund that was available to the public sector in order to unlock housing and was provided by Homes England. The fund is split between two branches:

- Marginal Viability Funding (MVF)

MVF was used to provide the final/missing piece of infrastructure funding to unlock new and existing residential sites. Applicants were required to demonstrate that there was a market failure present, and that funding is appropriate to bridge the viability gap. Bids for MVF were capped at £10m.

- Forward Funding (FF)

Forward Funding is used for upfront investment in infrastructure including transport, utilities, land assembly, green infrastructure and blue infrastructure. It is aimed at large schemes and bids for FF are capped at £250m.

Although these funding methods are now closed to applicants, it will likely be replaced by another similar National Home Building Fund programme in the future, probably to be identified through the spending review process. This is already evident in economic recovery programmes being introduced by Government such as the Levelling Up Fund.

6.2.9. Private sector infrastructure tariffs

The upfront cost of infrastructure is a major impediment to the pace of development and viability of large scale developments. The private sector can play a role in enabling this, for example through a master developer model:

- Put the infrastructure in place with up front capital expenditure – for example, through utilisation of Homes England Strategic Partnership Funding or Home Building Funding in order to reduce up-front costs.
- Licence serviced plots to housebuilders, so they only pay for plots once sales are achieved. This appeals to house builders as it more capital efficient, allowing them to deliver homes on a prepared site immediately rather than committing funds early in the development to site remediation, utilities, schools etc.
- This model allows the Master Developer to retain an element of control, as they effectively take the role of steward of the site.
- It is important to note that this model has typically been utilised on sites of considerable scale, such as those defined by OAPFs.

This model is unlikely to be replicable on a smaller scale or in an urban setting, where up front infrastructure/ remediation costs have the potential to be higher and more variable, with fewer serviced plots being produced.

6.2.10. Highways Act Sections 274 and 278

Section 274 of the Highways Act states:

"A council may contribute towards any expenses incurred or to be incurred by a highway authority if, in the opinion of the council, the expenditure is or will be of benefit to the council's area".

It enables local authorities to determine how they will raise their share of the overall contribution. This can be done through a combination of funds raised through planning obligations or by taking a percentage of receipts from Enterprise Zone business rate uplift. This allows local authorities more flexibility as to how the funds are raised and also provides infrastructure owners such as Highways England a degree of certainty about the amount of contributions as it commits the authority to make the payments, irrespective of how they secure the funds. An example of this is the DfT agreement with Peterborough City Council in 2016 in relation to the A14 Cambridge to Huntingdon Improvement Scheme. This was pursuant to section 274 and appears to be an efficient way for Highways England to capture some of the value provided by the construction of the A14 scheme.

Section 278 of the Highways Act states that:

"(1) A highway authority may, if they are satisfied it will be of benefit to the public, enter into an agreement with any person –

(a) for the execution by the authority of any works which the authority are or may be authorised to execute, ...

…on terms that that person pays the whole or such part of the cost of the works as may be specified in or determined in accordance with the agreement."

This does allow Highways England and highways authorities to charge for specific highways works, but still does not require a developer to enter into an agreement. Therefore, the developer must see the value of the particular highway works and therefore be willing to pay for the improvements. This may be possible in relation to specific development sites would be unlocked by the inclusion of highways access to the scheme but it would not be relevant in terms of a contribution to the wider costs of key strategic infrastructure schemes. Moreover, the Section 278 mechanism typically comes at the planning application stage which may well be at a time when delivery of the scheme is well advanced. At this stage, it is likely that highway works are already planned as part of the scheme and so developers will just wait until they are accessible and then take advantage.

Whilst there may be opportunities to use this mechanism for specific developments related to highways investment, these are likely to be small scale in nature and not form a significant component of the strategic scheme itself.

6.2.11. Tax Incremental Financing (TIF)

Tax Increment Fund (TIF) is used to fund infrastructure schemes through borrowing against future business rate income increases which are retained for a defined area. Typically, the capital borrowing is secured in the form of a Government (or other public sector body) backed loan. Business rates are charged to capture part of the value of the benefit that will be brought about by the introduction of new infrastructure and associated transport services. TIF has been developed as a model to stimulate significant regeneration or development that would otherwise not take place without upfront investment in new infrastructure and supporting transport services. Part of the costs of the transport project are recovered through the incremental increase in rates from future development of land within the specified area.

Forming part of various devolution deals, recent legislation allows the ring-fencing of increases in local business rates for investment by local authorities for pre-defined uses. A clear distinction between the local retention of business rate increases and a TIF is that the latter is a specific financing mechanism linking the uplift in commercial property taxation to a specific intervention (e.g. the construction of a transport asset). The funding of the asset is then recouped (in part) from the value of the uplift. For business rates retention, there is no specific link between additional tax receipts and any intervention as it becomes the responsibility of local authorities to facilitate and assist business growth in their area.

TIF has been widely used in the USA, and whilst successful in many cases, the approach has attracted criticism (e.g. costs of implementation and displacement of other local tax revenues) which has resulted in being used less frequently. In the UK, the approach is fairly immature although a TIF is currently in place to part fund the Northern Line Extension to Nine Elms. In this case, the TIF operated via a GLA loan of £1bn, guaranteed by the UK Government. Repayments are made from future growth in business rates, and by funds generated by S106 and CIL contributions from the Nine Elms Enterprise Zone. An important element in gaining Treasury approval for the TIF was a detailed economic study conducted to provide evidence that the business growth anticipated would be dependent on the NLE. In other words, the research proved that the business growth would be additional to the London and UK economy and not simply displace existing businesses already located elsewhere.

There are many benefits to a TIF approach including the stimulation of regeneration and other forms of economic development within a specific area. Moreover, this development and growth that would otherwise not take place can part-fund the costs of the transport scheme. An obvious risk associated with TIFs is that the public funder may be left with a large financial liability if development and growth does not occur.

A business rated based TIF for any strategic infrastructure in West London would not be a realistic option for most schemes with the exception of those that can be demonstrated clearly to enable net additional business growth. It is not a suitable mechanism for residential-led strategic development.

6.3. Housing Focused Funding Pots/ Mechanisms

In addition to funding that can be utilised to deliver infrastructure, this subsection highlights some of the available funding methods for delivering housing. Whilst these funding options cannot be used to deliver infrastructure, their use to assist in the delivery of housing could contribute towards the initiation of

6.3.1. Affordable Homes Programme Grant

The Affordable Homes Programme provides grant funding to support the costs of developing affordable housing for rent or sale, with the stated intention to initiate the delivery of up to 116,000 affordable homes in London by March 2022 by providing a total of £4.8bn Government funding. This grant can be used to initiate development of London Affordable Rent, London Living Rent and London Shared Ownership. Funding is available to Local Authorities and Registered Providers who have Investment Partner status with the GLA.

6.3.2. Estates Regeneration Fund

The Estates Regeneration Fund is a £140m project finance fund by Homes England, that is intended to be used to kick-start/accelerate the regeneration of estates by funding land assembly. This fund is available to the private sector; however, applications require the support of the local community and Local Authority.

Applications must be fundamentally viable in order to receive funding, and funding is available until it has been fully allocated. The Estates Regeneration Fund could be an effective way to deliver houses on brownfield or dilapidated housing estate sites, of which several have been identified within this study.

6.3.3. Affordable Housing

The requirements set by local authorities for affordable housing provision within any housing development are not traditionally seen as a type of 'land value capture'. However, the level of affordable housing that is achieved on new developments is often below policy levels which suggests that - where the developer can make a viability case - fully meeting policy requirements reduces land values. It is important to note that the mechanism for this is using Section 106 to collect contributions – the Government is proposing that this will be subsumed into its single infrastructure levy in the future.

Whilst no definitive data on the undershooting of affordable housing targets across England is available, a study of 11 local authority areas by Shelter in 2017 showed a circa 80% reduction from policy levels on sites where applicants sought dispensation to not meet policy levels. On this basis, the delivery of at least some of the policy level affordable housing provision can be seen as 'public policy' capturing value.

6.3.4. Business Rates Retention

The Government's move towards 100% local business rates retention builds on the current system, in which local government as a whole retains 50% of locally collected business rates. That system was introduced in April 2013. Before then, all business rate income collected by councils formed a single, national pot, which was then distributed by government to councils in the form of formula grant. Through the Local Government Finance Act 2012, and regulations that followed, the Government gave local authorities the power to keep half of business rate income in their area by splitting business rate revenue into the 'local share' and the 'central share'.

The central share is redistributed to councils in the form of revenue support grant and in other grants. The local share is kept by local government but is partly redistributed between local authorities through a system of tariffs and top-ups. This redistribution ensures that areas do not lose out just because their local business rates are low compared to their assessed needs.

Within the current system, councils keep up to 50% of growth in their business rate receipts arising from new or expanding businesses. Local authorities that pay tariffs are also liable to pay a levy of up to half of this type of growth. The money raised from this levy is then used to fund a safety net system. This system protects those councils which see their annual business rate income fall by more than 7.5% below their 'baseline funding level'. The government has said the new system will not have the levy on growth, however the safety net system is likely to remain in place and as such a different 'equalisation method' is likely to be put in place.

The government will pilot approaches to 100% retention of business rates in the Greater London Authority, but no details are yet available of how the pilots will function, with an announcement expected, alongside a consultation, in Autumn 2016. The Government has also announced various other reforms, including abolishing Revenue Support Grant when full business rate retention is introduced, and trailing various reliefs and, potentially, the ability of local authorities to set their own rates rather than relying on standard national multipliers.

For the purposes of assessing medium term opportunities for increasing value capture from new development the potential for retaining revenue from growth in business rates should be considered as an important funding opportunity for essential West London infrastructure. This requires a local policy approach whereby local authorities will ring fence the business rates growth as a result of the new development in commercial development units to help pay for critical, enabling infrastructure.

Business Rates Retention could in theory represent an important strand in delivery of infrastructure across West London assuming that proposed investments successfully unlock industrial development

and generates associated growth in business rates income across the boroughs. It offers an opportunity to access new and flexible financial resources. However, a particular challenge associated with business rates retention will involve the difficulty of accurately forecasting economic and business rate growth and the inevitable lag between investment in infrastructure and associated BRR income.

6.3.5. Direct Development

This model involves a local authority acquiring development land (or ring fencing its own land) and taking a lead in providing strategic infrastructure then disposing of the property to developers with or without the benefit of planning consent or Local Plan support. Land is acquired by negotiation with landowners or, if justified, utilising powers of compulsory purchase. If the local authority can acquire at pre-scheme values i.e. existing use value plus a modest uplift, then there is the opportunity to capture significant value uplifts as the scheme is promoted through the planning system. In reality it is difficult for public bodies to acquire at existing use values given that the land authorities are likely to be interested in will have an established policy designation which will have created 'hope value' amongst landowners and developers. Acquisition via compulsory purchase can be contemplated where acquisition by negotiation has not been possible. For compulsory purchase market value is paid reflecting the planning status of the land and so there is potential for value capture.

In terms of international examples of successful land value capture efforts, a high-profile development in Freiburg resulted from a substantial proportion of land being already owned by the public sector. This was then sold or leased to developers, with the profits being reinvested in the infrastructure and public services on which the planned development was dependent. In Freiburg, the land value that was captured by the local authority, covering almost the entire €95m cost of providing infrastructure to the 34ha site.

When public land is put forward for residential development, the maximum value is captured for new infrastructure and public services. This does not always equate to a monetised value, but instead on the basis of the proposed levels of affordable housing or commitment to providing the necessary infrastructure.

Development mechanisms that can be utilised include:

- Legal agreement with landowners/ developers which secure the repayment of infrastructure investment by the public sector. The costs of strategic infrastructure provision can be challenging for the private sector to forward fund. For the public sector early provision of key infrastructure can ensure that new communities have access to facilities from the beginning and that impacts of development are mitigated early.
- Joint ventures are also commonplace where the public sector seeks an equity share in the development proportional to its investment in supporting infrastructure and particularly where it is a landowner.
- Provision of finance (loans or guarantees) to support challenging cash flows.
- Usually where there is evidence of market failure the public sector has acquired sites and invested in site preparation and infrastructure provision and then marketed serviced land for sale thereby capturing the uplift in value

Development Corporations have proved to be successful vehicles in delivering new towns, large settlements and the regeneration of former industrial areas. They benefit from having the skills from across the development industry, a specific purpose to develop a strategic vision for an area, and the planning and delivery tools to implement it. In the context of LVC they could play a key role via direct development to capture value to support investment in strategic infrastructure including road and rail projects.

Clearly, a direct development role brings with it a significant degree of financial risk along with the need to ensure local authorities are equipped with the necessary resource and professional expertise.

6.3.6. Rail Plus Property Model

This model was used to fund the Hong Kong metro system enabling it to operate on a self-sustainable basis without subsidy. Key to this model is the provision of 'development rights' by the Government on land along the transport corridor. The Metro pays for this land at its value in a 'no scheme' world. Once the railway is complete and land values rise, this is captured by the Metro as the land is sold on

to developers. This then funds the new projects and supports the metro operations and maintenance costs. Ownership of the land is key to capturing value. Although this approach seems reasonable it would be resisted by landowners and currently public transport providers are only able to acquire the land required for the construction and operation of the infrastructure.

High Speed 2 has sought to recover scheme costs by capturing development value. HS2 like most statutory infrastructure owners can only acquire land that is necessary for the construction and operation of the transport scheme. All land is acquired at market value in a 'no-scheme' scenario utilising CPO powers. Where land is required only during the construction of the infrastructure 'Crichel Down' rules apply which requires the land to be offered back to the original landowner. There is an exception to this rule where the nature of the land changes substantially and cannot be returned to its original state at acquisition. This means that land required for construction in metropolitan areas and city centres can be offered to the market following completion of the railway at significantly enhanced values. HS2 also seeks to maximise the commercial returns through station oversite developments.

E-Rail has developed a methodology for capturing the enhanced value of the land and property in the immediate vicinity of rail stations after an improvement in transport accessibility. This methodology captures a share of that value secured solely for a specific rail project, promoting a partnership between landowners and the public sector whereby they share this newly created wealth to improve profits and help fund the railway. They believe that their approach can raise between 20% and 75% of the capital cost of a new transport line including stations and are concluding agreements with relevant landowners whose contributions will ultimately cover an estimated 25% of the total cost. For this to succeed, negotiations need to take place well in advance of developers securing options on the land, as once this occurs, they are less supportive of using the land value capture scheme. It is relevant to schemes such as Cambridge Autonomous Metro (CAM) where there is the opportunity to acquire land at agriculture plus values because route of options has not been in public view and the justification for development is very dependent upon the transport scheme. Road projects are on the other hand normally anticipated by landowners and developers creating hope value at residential prices that do not account for contributions to major road schemes.

6.3.7. Network Rail Shared Value Policy

Network Rail Infrastructure Ltd has an established shared value policy. This position is stated in the Office of Rail Regulation publication – 'Investment Framework Consolidated Policy & Guidelines 2010'. This states:

"*Network Rail can seek to share in the benefit of an increase in land value where that increase has been unlocked by providing developers with access to its own land or over its land. In doing so Network Rail must comply with relevant legislation. We would expect Network Rail to be mindful of relevant precedents, and not to frustrate developments from going ahead or significantly delay their implementation by adopting an unreasonable position. Where proposed developments have either direct or indirect rail-related benefits, we would expect Network Rail to have regard to this when negotiating with developers."*

It is an established principle in case law that where access to or over third-party land is required to enable development, it is reasonable that the owner of that land or asset shares in the value uplift that the development generates. It is often referred to as a 'ransom value' but Network Rail see it as a legitimate mechanism to contribute to their investment plans. Network Rail's normal negotiating position is that it will seek 50% of the uplift in value where only their co-operation is required to enable development. However, the financial agreement will depend upon the particular context and viability of the proposed development and a negotiated solution is expected with recourse to independent valuation or can be referred to a Lands Tribunal.

We have not been able to obtain information regarding actual contributions secured by Network Rail through the application of this policy. We are aware however that developers, landowners and local authorities routinely challenge this policy on the basis that there is little or no value to share with Network Rail once S106 and CIL contributions have been taken into account.

6.4. Infrastructure financing options

There are a number of sources of debt funding that are available for the purposes of infrastructure investment. While the scope of this study does not allow us to model different scenarios around the

types of debt available, we cover as an overview the types of funding sources that could be utilised to fund the wide ranging infrastructure needs identified for West London.

6.4.1. Prudential Borrowing

The public sector can borrow from the Public Works Loan Board (PWLB) at a low cost to fund its spending and represents a key source of finance which could be used to fund infrastructure. At present nearly all borrowers are local authorities requiring loans for capital purposes. The Commissioners are legally required, before making a loan, to ensure that there is sufficient security for its repayment. Moneys are drawn from the National Loans Fund and rates of interest are determined by the Treasury.

Local authorities use prudential borrowing for a wide range of purposes including efficiency savings, more efficient procurement, economic development and regeneration, partnership working, central government targets, better market operation, better capital programming, cheaper funding options, better asset management, innovation, and to fund housing programmes.

The Local Government Act 2003 introduced new freedoms and flexibilities for local authorities allowing them to increase their prudential borrowing. Borrowing is regulated by the prudential regime and must be in accordance with the Prudential Borrowing Code. Local authorities can borrow to invest in capital works and assets so long as the cost of borrowing is affordable and in line with the principles set out in a professional Prudential Code. Local authorities must use various prudential indicators to judge whether their capital investment plans are affordable, prudent and sustainable. The main limiting factor on the council's ability to undertake capital expenditure is whether the revenue resource is available to support in full the implications of capital expenditure.

In summary prudential borrowing represents a key source of affordable finance which could be used to meet the upfront costs of key infrastructure. The proceeds from development and alternative sources of funding and grants could then be used to repay this capital loan. However, whilst this could help meet the upfront costs of infrastructure, it will increase the overall costs due to the need to service debt on the loan. This interest rate could change over time leading to the need for lower or higher payments to finance debt. Current PWLB borrowing rates are significantly lower relative to private sector comparators.

6.4.2. Local Government Bond

A bond could be issued by a local authority and the proceeds applied to infrastructure projects across West London. There is a possibility of accessing the bond markets for local authority finance, taking advantage of the strong credit ratings that are enjoyed by many local authorities in order to access finance at attractive rates.

It is possible that bond finance could be relatively cheap, potentially even cheaper than PWLB borrowing; however, this will be dependent on how the infrastructure is packaged and the perceived risk of coupon and principal repayment. The bond market is relatively untested in the local authority market for capital purposes and there are challenges around timescales, offering an appropriate size of bond offering, target investors, associated costs – as well as risk attached to the security of revenue streams that would service the bond, so that local authority financial prudence is maintained.

6.4.3. Institutional Finance

The large amount of investment required at Opportunity Areas within West London requires significant forward funding of infrastructure. While public sector borrowing is also an option, utilising the significant resources of institutional funds is an option. This could be pension funds, insurance companies, infrastructure investment funds and sovereign wealth funds that can take long term funding horizons. The important aspect in getting investment from institutions such as pension funds is ensuring that the infrastructure investment can be structured in order to match their liability profiles. This can often prove to be difficult given the requirement for fixed returns at specified intervals and the uncertainty of returns being generated from infrastructure.

The government is currently looking at a number of ways to get institutional investment involved at the earliest stages of developments, including the delivery of infrastructure and mechanisms being considered include government backed guarantees to unlock the capital available to these

institutions. The key issue is that there is no single solution that will be appropriate to all types of institutions. First, not all institutional investors have equal expectations. Pension funds, insurance companies, reinsurers, state development banks, insurance funds and sovereign wealth funds all have different mandates and different return expectations for their investments. Their governance structures and their investment cultures vary as does the applicability of financial regulations. Even with smaller pension and super-annulation funds, we see differences among them - from risk appetite and portfolio diversification targets, to the in-house (or not) ability to do risk assessments of individual investments.

That said, many institutions are looking at infrastructure as part of their portfolio of investments and should the appropriate structures be developed then institutional funding will be able to form a significant source of future infrastructure funding. This would also be subject to the lending policies of the relevant institutions.

6.5. Alternative Infrastructure Financing Mechanisms

6.5.1. Council Tax

Council tax is most commonly associated with funding of local authority revenue expenditure items such as adult social care, waste and cleaning services across their boroughs. However, the option of hypothecating Council tax for the purposes of investing in infrastructure is a distinct possibility. Though not common, it is not unknown for Council tax to be used for infrastructure – In 2009/10 Croydon Council included a 1.9% increase in their Council Tax, which was hypothecated for capital projects. . There was a demonstrable need for significant capital investment across the Borough, including enhanced infrastructure, as a result the decision was taken to hypothecate the increase.

Clearly this is a political decision that needs to be in line with the Authorities strategic approach to service delivery, however, it has proved to be an effective tool for other Councils and could be a powerful tool for West London.

6.5.2. Development Consent Orders

It is theoretically possible that the existing Development Consent Order (DCO) mechanism could be used as a route to capture land value from infrastructure investment. However, a number of complex issues would need to be resolves before using DCOs could be considered. These include: consents required from the Secretary of State and HM Treasury; liaison with PINS, as well as further public consultation once the exact nature of the contribution to be sought has been established. Also, given the completely novel approach associated with using DCOs for value capture, there is a risk that the DCO itself will be challenged by landowners, developers or even local authorities.

The DCO would be seeking to include a provision requiring that developments in the local area benefit from the Scheme help to contribute to the costs of that scheme. By the DCO using Section 120 of the Planning Act 2008, it seems possible that infrastructure owners would be able to use the DCO for a given scheme to collect contributions to offset capital costs. However, this approach has not yet been tested in a consented DCO and therefore brings with it the risk of being novel and untested. There is a possibility of it being challenged by landowners and developers affected, as well as local authorities who may be concerned by the adverse impact of the additional contribution that they would be tasked with collecting. Therefore again, it would be important to secure cross-boundary, local authority support before including a provision of cost contribution within a DCO.

6.5.3. Stamp Duty Land Tax

Stamp Duty Land Tax (SDLT) is a tax levied on property or land transactions and has been reformed over the last 10 years to account for house price inflation which has occurred over the same period. SDLT currently is payable to HM Treasury via HMRC and is not an established LVC mechanism. Several recent studies have introduced the notion that uplift in SDLT caused by the increased value brought about by infrastructure investments could be included in a broad land value capture mechanism. This would require devolution of fiscal authority for SDLT to local authorities.

The devolution would provide the option of capturing the increase in tax receipts due to increased property values or increased transactions due to a buoyant property market and supply of new homes stimulated by strategic infrastructure investment such as the WLO. Clearly, in doing so, a strong

collaborative agreement would be required between the infrastructure owners and local authorities in West London.

An advantage of SDLT is that it can capture uplift in value from existing properties compared to S106 and CIL which is restricted to new development. However, challenges to using SDLT as a value capture mechanism include:

- Change in statute required.
- Revenue generated following transactions and not 'front-loaded' in advance of infrastructure investment.
- SDLT is a volatile source of tax revenue.
- Local authorities in West London would need to agree common use of devolved fiscal powers.
- Purchaser of land and property pays rather than the seller who has benefited from the value uplift.

6.5.4. Development Rights Auction Model

Another untested, potential value capture mechanism was explored in recent years by TFL and the GLA. Focused on development and regeneration enabling rail schemes, TfL and GLA considered the introduction of a Development Rights Auction Model for zones with high development potential. The model requires the preparation of an integrated zonal development plan for zones of influence around new station locations on a new rail project. The auctioning authority, which would have powers to assemble land and grant planning permissions, would coordinate land pooling and auctioning of developable plots. Due to the new transport investment and coordinated master-planning, the value of the pooled land would be higher than the value of individual land holdings before assembly. The income generated, above a set reserve price, would then be shared between the landowners and the auctioning authority, which would use its share to fund transport investment.

Transport for London commissioned advice on how this model could be applied. The report published in 2018 applied the approach to two case studies: a station of the Old Kent Road on the line of the route of the Bakerloo extension, and a station on the route of Cross Rail 2. Although the Old Kent Road case offered more potential the opportunity to use this method presented a number of challenges including:

- The reserve price is set too high limiting the opportunity to secure for land value uplift. This can be as result of landowner expectations and in urban environments there is the potential for compensation to aid existing occupiers to relocate.
- If the value is set too early, it may not capture the future uplifts in full and landowners will want consideration of future revenues if the development programme is over many years.
- Securing landowner and bidder participation may prove challenging as would agreeing 'reserve prices.'
- It may impact the ability to capture 'planning gain' as DRAM may, in reality, only capture a relatively small uplift in value due to early bidding and discounting of future revenues.
- The process is inflexible to changing market conditions.

In addition to the existing and potential mainstream and strategic funding sources for development enabling infrastructure described above, funding opportunities also existing for specific infrastructure types. This funding environment is particularly dynamic and is subject to ongoing change. Key sources available at present are identified below in the discussion on infrastructure delivery in West London.

6.6. Strategic sector delivery

In addition to the existing and potential mainstream and strategic funding sources for development enabling infrastructure described above, funding opportunities also existing for specific infrastructure types. This funding environment is particularly dynamic and is subject to ongoing change. Key sources available at present are identified below in the discussion on infrastructure delivery in West London.

Taking a sectoral approach, the following highlights some of the key delivery factors and priorities for essential infrastructure required to enable housing and economic growth focused development in West London.

6.6.1. Transport

With the dramatic impact of COVID-19 on daily lifestyles and travel behaviour, there is considerable uncertainty at present regarding the future investment plans for transport in London. Having engaged with TfL, it is acknowledged that the organisation is unable to provide specific input on the priority of schemes due to their current position and without a funding deal yet secured. All funding for design and implementation of projects has been put on hold and there would need to be a review of all projects in light of changing user behaviour due to Covid-19. However, TfL remain in support of investment in key growth-enabling transport infrastructure in West London including, for example, West London Orbital. WLA and West London authorities should continue to collaborate and establish clear evidence of need and economic impact of strategic transport investment in the area. Moreover, investment in sustainable transport infrastructure and initiatives to enable and encourage modal shift remains critical for the sub-region. In partnership with the GLA, this could include consideration of an alternative funding mechanisms such as non-residential private parking levy, with revenue ringfenced for investment in clearly identified public and sustainable transport priority projects.

Multi-modal shift

Modal shift recommendations should be focussed on:

- Appealing and accessible cycling networks, using segregation where possible;
- Appealing and accessible pedestrian routes, utilising green spaces as possible;
- The linking of cycling and walking routes to transport hubs;
- The effective provision of cycling parking facilities across West London's sites; and
- Express bus routes to rail and Underground/ Overground stations and between key residential and employment areas, using priority lanes as possible.

Collaboration and cross-boundary working is an important aspect across these challenges. With high private vehicle dependency in parts of West London as well as vehicular use in the sub-region's critical logistics sector, and following the ULEZ extension, electric vehicle uptake and supporting infrastructure is particularly important.

Electric Vehicles (EVC)

A key strategic trend that will impact on London and other metropolitan areas over the next 20 years will be the uptake in use of electric and autonomous vehicles. It is difficult at this time to correctly predict what the EVC infrastructure will look like in 2040 as EV technology particularly battery technology is constantly being developed. The challenges have also been identified earlier in this report. A key challenge is whether the local DNO network can accommodate the additional loads, where extensive upgrade will be required.

Coordination is required with EV producers, TfL and Highways England, the DNOs, the National Infrastructure Commission, Ofgem, the Office for Zero Emission Vehicles (OZEV) and London Councils' Go Ultra Low City Scheme. And a consistent approach across West London is recommended, utilising West London's existing assets as industrial and logistics centres and retail and leisure centres for charging infrastructure across the options set out above, notably EVC forecourts, rapid super charging hubs and hydrogen refilling points.

A consistent approach across West London is recommended, utilising West London's existing assets as industrial and logistics centres and retail and leisure centres for charging infrastructure across the options set out above, notably EVC forecourts, rapid super charging hubs and hydrogen refilling points. There may also be scope for local authorities to use access to street assets as leverage for the enforcement of common standards.

For the non-domestic off-street parking market there are currently a number of EVC manufactures who install, maintain and operate EVCPs. Registration is required to use these EVC, usually via 4G or 5G networks. For these schemes (Street parking / charging) the EVC contractor will install the EVCPs, pay the DNO for connection then recoup their capital cost via the kWh charge. A current

drawback of this scheme is if you wish to use different manufacturers chargers, you need to register your details for each. It is likely Government legislation will be needed to resolve this issue using an open protocol charge scheme.

As the need for EVCPs increases, and the forecourt model becomes more available it is likely market forces will determine the price per kWh, akin to large supermarkets under cutting fuel suppliers and this would result in the EV user shopping around for the best charge rate.

If the EVCPs are connected to a Landlord's electrical supply (industrial developments) either the landlord would pay for the installation and connection, then the EVC operator takes payment as above (cheaper rate) and takes a percentage to cover operating costs with the remainder going to the Landlord.

For private industrial developments or private car parks where EVCPs are installed, the Client will pay the capital cost of the EV installation and then make no charge for staff use.

In addition, the UK Government – Office for Zero Emission Vehicles (OZEV) offer grants to local authorities to provide EVCPs within their borough. It should be noted only approved EVC manufactures can be used by this scheme. But for residential EV charging it should be considered. There are also several Central and Local Government schemes which offer subsides for the roll out of EVCPs.

West London Planning and timeline

Planning requirements can mandate the provision of electric vehicle charge points in new developments, in line with the London Plan. It is recommended that standards are set. It is recognised the challenge of any timeline alignment with emerging developer standards, where a developer can agree to a level of EVCs, but this may not be sufficient in quantity, quality or type once the development is delivered.

The provision of hydrogen refuelling stations and rapid EVCPs at logistics and industrial locations is supported. Chargers suitable for public access, such as at retail / public car parks, urban centre streets and leisure centres as well as charge pillars and lamp posts will likely be part of the provision response.

For West London and its strategic growth areas, it will be difficult to install EVC to all domestic properties, although it is noted not the role of public transport and that car ownership can be predicted to remain as it is currently or to reduce.

As recharge times reduce, and EV range increases Atkins best estimate is the development of charger hubs which will eventually replace current filling stations (Circa 2045). This should provide enough charging points for the domestic users. Non-domestic users (fleet owners, taxis etc) will also use the central hubs, but larger fleet owners would generally have dedicated EVC in their depots.

Due to the continued fast pace development of both EV battery technology and respective chargers, it will be prudent to deliver EVCPs on a phased approach. An overall strategy should be in place to ensure the correct number, location and type of charger is correct, but this would need continual updating as technology develops, charging rates change and the uptake of EV is more determined.

6.6.2. Digital

A consistent approach across West London is recommended to allow for greater co-operation and shared best practice between local authorities and ease data-sharing. As is being taken forward by the West London Alliance Digital Strategy work. This is also taking a collaborative approach to identifying investment cases and presenting these to the market, alongside coordination for accessing available funding sources.

The uncertain nature of the pandemic in the UK and the emerging trends will require the needs to be revisited in the near future. Several technologies that are recognised as improving London's connectivity may become dated where their rollout is slow. Greater clarity as to the longevity of the technology being advocated would allow for better future planning.

Paragraph 113 NPPF states that digital equipment should be sympathetically designed and camouflaged where possible. The WLA can look at how this may be achieved in order to not damage

the public realm with a common approach to good design practice. A settled planning framework (or SPD) may allow for greater cohesion during the rollout between authorities.

The SIDP has set out some potential use cases for West London to shape its digital offer by signalling to the market and focussing investment. This will support West London in driving a digital recovery as a leading sub-region.

Engagement with providers will be important to start developing privately viable use cases. This will also help understanding for where these investment areas can in turn accelerate other opportunities, where the public sector may need to lead delivery and seek funding. Market providers can be encouraged to come forward with plans to combine upgrades with new infrastructure for smart city solutions such as EV charging, traffic management and environmental monitoring into a single project covering accelerate digital and zero carbon infrastructure. This could be supported with a published West London case for investment or portfolio, demonstrating opportunities alongside developed codes of conduct and access and agreement models.

There is an opportunity for West London to employ a model akin to Croydon's open access model for street furniture for telecoms/5G infrastructure providers, committing to a programme of Open Access Agreements and policy positions. This will create a large-scale investment opportunity for 5G networks and send a powerful signal to the market and government that West London is taking a lead in driving a digital recovery.

Best practice is important in the shaping of fibre and 5G roll out and use cases.

For West London, the following are some important steps in meeting the digital need and opportunity:

- **Data and mapping**, covering the access to infrastructure, current fibre, wireless provision and assets for 5G, as well as ownership[288]. This will inform the West London boroughs in shaping their strategy, supporting a positive market response and accelerating roll out. Further, data can enable demand to be aggregated across public and private sector uses.
- **Early engagement** is important, and the West London providers expressed a keenness to be involved once planning is approved so they know what and where infrastructure is, including existing duct and Openreach network. The sharing of surface, road and street works pipeline with providers can form positive coordination. Further, the engagement process can be developed to link in with investment cycles and the opportunities for West London.
- **Cross-sector coordination** provides a role for the WLA or boroughs in ensuring collaboration between developers, transport and utility providers with digital providers to deliver in a more effective way with works alignment (e.g. road, stations or utility network upgrades). For example, a fast track highways service for broadband providers can facilitate access.
- **Utilise wayleave templates**, available as standardised templates from the London level, as well as sharing approaches and lessons learnt between the boroughs. Where suitable to provide a collaborated West London approach to accelerate fibre deployment into social housing and enhance viability for other premises.
- **Valuation of street assets** considering area and density differentials, and reflecting ECC guidance. This would enable a West London position and approach to street asset access and use to be developed and then opened to procurement.
- **A West London digital infrastructure code of practice** for all new developments, using planning policy. This would guide the development and delivery of digital infrastructure, which would be committed to be providers and operators. This would usefully cover engagement; access to infrastructure; a dig-once policy and disruption management; planning and street work standards; digital inclusion and social value.
- **A West London procurement and partnership approach with smart city providers** supporting a stronger case for investment with the right collaboration and steering of use cases.

[288] Reflecting the DCMS made a call for evidence to improve understanding

The West London Build and Recover Taskforce has made recommendations to help develop new investment opportunities in this space. This includes a 5G investment fund to streamline wayleave processes and co-invest with the private sector for scale deployments of 5G use cases (such as real time logistics and traffic management and remote healthcare applications); and to seek grant funding for a programme of small business research initiatives to create opportunities for innovation in growth sectors.

6.6.3. Decarbonisation and energy

The adoption of new technologies may present investment challenges in the short-term future as the capital costs for low carbon technologies remain higher for renewables than for gas, as an example. The Levelised Cost of Electricity (LCOE) is the discounted lifetime cost of building and operating a generation asset, expressed as a cost per unit of electricity generation (£/MWh). It covers all relevant costs faced by the generator including pre-development, capital, operation, fuel and financing costs. Renewable energy has entered a virtuous cycle of falling costs, increasing deployment and accelerated technological progress.

However, there is still an outdated perception that renewable energy is not competitive which forms a significant barrier to its deployment. Renewable energy generation and new technology deployment is critical for the West London boroughs to achieve their carbon reduction targets and net zero aspirations, aligning with the London Plan. The continuing cost declines associated confirm the need for renewable power as a low-cost climate and decarbonisation solution; however, it is imperative that an investment framework is developed to ensure that Opportunity Areas are able to deploy low carbon infrastructure despite conventional generation returning lower capital costs at present.

There is an opportunity for boroughs to work together to develop solar farms or a policy position on this so that options can be developed and taken forward especially on areas of land that cross borough boundaries. This will support the procurement of energy to move from the grid to renewable sources over time.

Engagement with energy and environment teams has identified a number of existing challenges with Net Zero and future proofed energy provision within the Opportunity Areas including[289]:

- Existing capacity issues at Park Royal with regards to electric vehicle infrastructure and heating;
- Power shortages and black-outs reported in the area;
- Lack of clarity regarding funding for a new heat network;
- Lack of clarity on energy storage and how to balance grid and reduce peak demand;
- The need for a flexible plan for local area distribution and storage; and
- Lack of finance and resources to facilitate the transition to zero carbon at the local authority level.

The challenges identified traverse all of the Opportunity Areas. Lack of funding and unclear delivery are frequently highlighted as the primary threats to future infrastructure development and need to be addressed with a clear investment framework and implementation programme, if the identified needs highlighted in Section 4.3.5 are to be realised successfully to enable West London to achieve its carbon reduction targets.

Feasibility studies for district heat networks and decentralised energy that have been undertaken to date for the Opportunity Areas have raised common issues regarding funding and delivery. The lack of clear finance and funding cases have stalled the progress of interventions.

For the Opportunity Areas where decentralised energy is a key focus, the WLA and boroughs have a unique opportunity to implement change in a sector that is dominated by private funding. There are a number of public bodies that can fund these schemes using capital reserves or borrowing and also can then generate and sell electricity efficiently. The uptake of implemented decentralised energy schemes is rapidly accelerating due to digital technologies and improved economics which make them less expensive to install and easier to manage and operate through the use of on-site generation and micro-grids where the supply is located very close to the demand centres.

[289] SIDP engagement: OPDC Environment Team (September 2020); Ealing energy colleagues (September 2020)

The boroughs have also considered the London Heat Map in identifying sites to prioritise delivery and generation in matching heat sources with heat users as opportunities for decentralised energy. One of the key challenges here is with a need for collaboration between utility partners and developers and to share costs where pipe networks can be costly. This can also be disruptive to the transport network and as such timely delivery is critical.

The development of a West London Heat Energy Masterplan for the sub region could address these issues with further analysis of the GLA heat map being undertaken to explore what viable opportunities exist and how they can be furthered.

The broader challenge areas for energy and utilities can be summarised as:

- **Infrastructure timeline and spending** - If utilities are not provided at the right time, they can stall development plans. West London's society and economy is reliant on utilities infrastructure and therefore there is a need to invest in this infrastructure both in terms of maintenance of existing infrastructure and/or replacement as well as for upgrades and new infrastructure. The source of funding whether it be from the private or public sector needs to be identified early to ensure that the infrastructure delivery plan and programme is not affected.
- **Ownership and consumer behaviour** – Within the Opportunity Areas, thousands of residential units will be developed. It is important that the demographics are considered in order to assess how people will consume energy and how this might influence projected demand. For example, single occupancy dwellings that are home to older residents will likely consume less energy than young families, whilst home working will increase domestic demand. This will be more critical when considering on-site power generation from individual plant rooms and heat pumps as opposed to wider district heat network schemes.
- **Local issues and collaboration**– Across several boroughs, utilities have been highlighted as a critical sector with limited availability in some areas and with the relative cost of upgrading the infrastructure stalling development. This in turn can deter investment if a strong dialogue is not maintained between not only the individual developers, boroughs and utility providers but also between the boroughs themselves, for example where Opportunity Areas combine and span across multiple boroughs.

Central to achieving and delivering on renewable energy, low carbon and Net Zero goals in West London will the need for collaboration and integration across local authority boundaries. The energy needs and priorities associated with future strategic development plans in West London are equally shared by all local authorities in the area. Therefore, focused on the net zero carbon agenda, a joint energy need and delivery strategy across all West London authorities is critical.

Further, for energy efficiency and reducing carbon emissions associated with domestic and non-domestic build and infrastructure, the WLA can adopt and follow steps outlined in the UK Green Building Council (UKGBC), alongside the existing RE:Fit programmes and approach set out in the London Plan. The UKGBC published definitions for net zero carbon buildings[290], which provides the property and construction sector with clarity on the outcomes required for a net zero carbon building. The framework sets out definitions and principles around two approaches to net zero carbon, which are of equal importance:

- **Net zero carbon – construction**: "When the amount of carbon emissions associated with a building's product and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy."
- **Net zero carbon – operational energy:** "When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."

6.6.4. Utilities – Water, electricity & gas

The developers, local planning authorities and utilities providers need to collaborate to ensure that capacity requirements are communicated early on during the site scoping and feasibility stages to

[290] *Net Zero Carbon Buildings: A Framework Definition,* UKGBC (2019)

enable developers to accurately provide cost estimates and programmes for the future developments. This is critical for large developments where new district heat networks and sub-stations are required.

Upgrading critical electrical infrastructure can require significant upfront planning. Decisions on equipment technologies and capacities for future growth need to be made before proceeding with detailed design and will determine the number of units that can be supplied as a result of the new infrastructure. Organising utility connections is often cited as a common cause of delay in construction projects due to three key issues, network connections, location of the infrastructure and metering. Once planning permission has been granted, it is critical that utility providers are engaged to ensure that the designs and wider masterplans are compliant with utilities legislation, codes of practice and industry standards. In addition, utilities protection, diversion and upgrade works form part of the enabling works on major development schemes. Any utilities diversions, for example diversions of underground transmission cables or over ground towers, or indeed installation of new cabling, substations and energy infrastructure will need to be undertaken ahead of the development.

Effective forward planning and early stage engagement for utilities is in the interest of everyone involved or benefitting from sustainable development. This includes developers, planners and utility providers. It also includes the general population as the ultimate users of utilities. Appropriate utilities provision delivered at the right time and place is essential for new development. A breakdown of effective forward planning for utilities can lead to development sites stalling or not being delivered at all. It also creates the risk that existing networks could fail. This is because existing users require security of supply which means that the capacity of the existing utilities network must be increased and infrastructure upgraded as the population increases. Planning for future and existing needs in West London requires effective, strongly collaborative forward planning if development and growth objectives are to be achieved.

It should be recognised that the task of effective utilities planning is not a straightforward one. A variety of factors such as the scale and complexity of the utilities network in a metropolitan context, long and complex construction processes for network reinforcements and the need to ensure security of supply for existing users creates a complex delivery environment. Moreover, the responsibility for maintaining and delivering utilities provision rests with a variety of private companies operating within a regulated natural monopoly. Utilities are considered a natural monopoly because it is not practical or viable for competitor companies and market entrants to install their own cables, pipes and wider infrastructure required to operate a utilities network.

Each of the three main parties have their own ways of planning for utilities to enable development. Their primary roles can be stated simplistically as follows:

- Planners – plan where development should go to best meet the public interest
- Developers – build new development
- Utilities – ensure new developments have access to water and energy

The land use planning system is governed by the National Planning Policy framework (NPPF). The NPPF states that the purpose of planning, and therefore LPAs, is to help achieve sustainable development. This is primarily achieved through the development of Local Plans. Regarding utilities planning, at paragraph 162 the NPPF states that: *Local planning authorities **should work** with other authorities **and*** (infrastructure) ***providers** to:*

- *assess the quality and capacity of infrastructure for transport, **water supply, wastewater and its treatment, energy (including heat),** telecommunications, **utilities**, waste, health, social care, education, flood risk and coastal change management, and its **ability to meet forecast demands**; and*
- *take account of the need for strategic infrastructure including nationally significant infrastructure within their areas.*

The NPPF highlights that Local Planning Authorities have a duty to engage with utilities providers at an early stage to understand whether utilities capacity and/or their viability could hinder development. The exact process for engagement between LPAs and utilities providers is not formally prescribed. However, by convention it takes the form of a request by the LPA to the utilities firms during the plan making stage.

Developers and landowners have an interest in developing sites if they can make a reasonable profit. To achieve this, they typically need to understand the full costs and practical implications of construction before making the decision to initiate development. Because utilities are such a critical component of development it is very important that developers fully understand the costs and timing implications of providing utilities at their site. Gathering this information is effectively the developer's utility planning process. This takes the form of direct enquiries to utilities firms. Getting firm cost estimates and quotes generally requires the developer to pay the utilities firm although the utilities firms have a regulatory requirement to provide information on connection costs to developers (see below). As developers and landowners require planning permission for their development, they are also indirectly bound by the principles of the NPPF. This includes the need to demonstrate that their sites are viable and deliverable i.e. achieving a connection to the utilities network is both affordable and achievable.

As highlighted earlier in this report, utilities firms are private regulated companies. Utilities firms have a regulatory obligation to develop and maintain an efficient and economic network. This means they can plan for and invest in their networks to anticipate future demand if it is deemed cost-effective for existing and future consumers. Any anticipatory investment should be included in long-term investment plans that are agreed with the regulator. These long-term plans include Asset Management Plans (AMP) for the water sector and network investment plans for the energy sector. Anticipatory investment such as this would mean the costs of reinforcement are shared between all utilities users. Under this scenario, the instances of utilities capacity hindering development should in theory be minimised. Although this system would appear to be an effective way to forward plan for utilities there is one key issue. This is termed the 'gold-plated network' issue. The issue is that the utilities regulator has a remit to ensure that charges to existing users are kept as low as possible. By anticipating demand and creating a 'gold plated network' existing users can end up bearing a high cost. There is also the risk that infrastructure could be installed but then left unused if planned development does not eventually occur.

Another factor to discourage anticipatory investment is that it is often difficult to accurately predict when and at what level development will occur. Historic rates of development often demonstrate that planned development did not occur in the way it was originally predicted. The amount of planning permissions won on appeal add to the lack of certainty and effectiveness in forward planning24. The 'gold-plated network' issue and the uncertainty around what development will come forward arguably create a disincentive for utilities firms to conduct effective forward planning. It is often easier to react to requests for connection as and when they occur. Utilities providers have a legal duty to provide an offer of connection to the utilities network to those that requests it25. To make a connection offer the utilities firms expect the developer to provide a formal request for connection with accompanying information such as the capacity required.

The process described above is a reactive rather than a plan led approach to utilities provision. While in many circumstances this process results in an acceptable and deliverable offer of connection there are many cases, where connection requests result in the need for significant network reinforcements. The time and costs involved in this scenario can often lead to stalled or sterilised development. When this occurs, it demonstrates a break down in the utilities planning process. It is notable that utilities firms are not directly bound by the NPPF as developers and LPAs are.

Despite the long-term planning process associated with the development of Opportunity Areas in West London, the process of enabling utilities capacity to be provided is typically based on a shorter-term planning process. Any planning often happens on a site by site basis. This process can be termed the site utilities connection process. As well as identifying issues with the forward planning process the research in this study has uncovered issues with the connection process.

One of the key findings of the engagement process was that the system of assessing what utilities reinforcements are required to support a development is inherently complex and uncertain. Each development is different and the level of information available varies for each site. This makes the application of a clear set of connection charging rules and costing methodologies to each case of development extremely difficult. The research in the study has also uncovered that there is often a general lack of awareness of how the system should work and what the rights of developers and responsibilities of utilities firms are. Perhaps due to the complexity and time consuming nature of the system there is an element of avoidance in some circumstances of the either following or enforcing the 'rules'. Unless the details of a development are fixed and the development planned to be delivered imminently there will always be a degree of uncertainty about the utilities works required. This is

especially relevant for employment uses as the exact nature of the utilities requirements of the businesses is normally unknown before construction takes place e.g. speculative development. For housing, it can be easier to establish works required as standard assumptions on loadings per dwellings can be made.
In conclusion, there is a system in place to define the rights and responsibilities of utilities firms in providing quotes for works to connect new developments. However, due to a combination of a lack of awareness and the inherently complex nature of the system the application of this system in practice is often ineffective. Appropriate investment and governance frameworks need to be development and implemented early in the feasibility study process to ensure that the long lead times and implementation of utilities upgrades and infrastructure do not act as constraints to the future development in the boroughs.

6.6.5. Alternative approaches to utilities planning & potential reforms

The regulatory system for utilities in the UK was largely established in the 1980's and 1990's. There has been little fundamental change since that time. Although this system is seen by many experts as being successful at delivering investment and providing good value for money for utilities users, there is increasing acceptance that the system could benefit from some reform. This is outlined in the recent housing and planning white papers and the Industrial Strategy. Most of the suggested reforms relate to increasing transparency, promoting competition and increasing investment in new infrastructure to enable quicker and more efficient connections for developers. There are also alternative models of utilities delivery from other parts of the
world that could be considered.

In recognition of the fact utilities can sometimes hinder development coming forward at the right time and place OFGEM and OFWAT have put in place regulatory reforms. For electricity and gas, the main reforms promoted by OFGEM relate to the following:

- New price controls for utilities firms based on revenue, incentives, innovation and outputs (RIIO).
- Promotion of developer consortia to pool funding and organisation for provision and payment of major network reinforcements
- Encouragement of joint working between different utilities.
- Encouragement of earlier and more open communication between utilities firms and local planning authorities when planning utilities capacity to meet future housing and employment needs.

OFGEM has recognised that forecasting future connections is difficult. This has historically led to problems of a lack of utilities provision hindering some developments. The key issues OFGEM have acknowledged include the following:

- The system is complex with many factors including different economic conditions, changing government policy and technology innovation having a significant impact on what, when and where connections are needed.
- Significant growth in connections for new generation to the distribution network has outstripped many forecasts
- The network's ability to accommodate these new connections has become increasingly limited
- Physical constraints in the network can mean that new connections can't be accommodated without (often costly) reinforcement to add new network capacity.

Industry Consortia

Significant benefits can be achieved through joint working between different utilities. The Regulators and Government are keen to promote greater joint working although it is unlikely that changes to regulation to force it to occur are likely in the short term. This can be achieved through effective and consistent implementation of existing regulation, with local authorities and utilities working together better to co-ordinate planned works, raise standards and reduce disruption. Joint working should also reduce costs overall.

A key observation of the study is that there is often a relative disconnection between the perception of the 'rules of the regulatory system' and the actual 'rules', also between regulatory 'theory' and 'practice'. A good example of this is the need for utilities to engage early and robustly with Local Planning Authorities (LPAs) to help them in the plan making process. The consultation with the regulators suggest that they expect utilities to robustly engage with LPAs in Local Plan making. They seek annual engagement reports from providers to support this expectation.

However, in practice it seems often the information provided by utilities firms to support Local Plans and Community Infrastructure Study (CIL) evidence bases is relatively superficial. It was observed that the responses provided by utilities often state something to the effect that '*network capacity is deemed sufficient to support development although detailed modelling is required to provide an accurate response and this is only performed at the network connection stage*''.

This study has uncovered this is often too late to leave the modelling of network demand to the connections stage, because if major reinforcement works are only uncovered at this stage it can mean the site becomes unviable or it can be significantly stalled. If this occurs, it can put the overall Local Plan at threat. The process of gathering site specific information to inform this study and our team's professional experience highlight the fact that getting useful information about the scale and cost of network reinforcement works required for new development is currently very challenging, and that the system is currently not really set up to deal with this type of early 'strategic planning' request. OFGEM stated when consulted as part of this study, that to address this issue early robust communication between utilities and local planners is a requirement of the regulatory system. However, they are aware that the practicalities of enforcing it effectively are significant despite utilities being required to demonstrate effective engagement. In conclusion, it appears that this is one area that could benefit from a combination of better enforcement of the existing regulations and a better communication and awareness raising of the issue.

Overview on utilities planning, funding and delivery

Current practice indicates that there is a clear disconnection between the way utilities planning should work, compared to how it seems to work in practice. The UK regulatory system is mature and although 'on paper' it appears appropriate, there is significant evidence of where it fails to ensure utilities are provided at the right time and place to enable new development. This issue is accepted by Government and the Regulator as seen in the Housing White Paper, Industrial Strategy and the regulatory reforms such as OFGEM's Quicker and More Efficient Connections and RIIO financial regime and OFWAT's new water connections charging regime. The key to addressing the issue is; closer and earlier communication and joint planning between utilities firms, developers and local planning authorities. The West London spatial planning unit is especially important in planning for and delivering utilities needs for strategic development sites over the next 20 years. Case studies from across the world demonstrate that when utilities planning occurs in this way utilities are generally not an impediment to development.

Engagement which took place for this study indicates that open and useful dialogue in terms of utilities needs for future developments is challenging despite general willingness from all parties. In this respect, it is partly an issue of 'culture'. It appears change is therefore necessary, but the key question is; 'what form of change?' Although some regulatory reform is occurring it seems that more radical regulatory reform is unlikely in the short term. Therefore, in conclusion pursuing a more 'bottom up' approach of promoting dialogue between planners, developers and utilities supported by targeted 'pump priming' funding is perhaps the best way forward. The collaborative, cross-boundary West London forum is essential to ensure this bottom-up approach can be delivered.

Summary

Funding and delivery of key infrastructure needs in West London will require a strongly collaborative and integrated approach across local authority boundaries. This study has shown that West London requires a complex programme of infrastructure investment to be planned and delivered not only to accommodate the replacement and upgrading of existing assets provided to serve the existing population but also to address the growth aspirations associated with the area's substantial share of London's Opportunity Areas. Increasing options for grant funding, financing and private sector investment are emerging which offers significant opportunities for West London. However, to fully benefit from these funding and financing opportunities, significant strides will need to take place in co-

ordinating planning and funding approaches across local authorities and in enabling better ‘bottom-up’ integration between planners, developers, landowners and infrastructure operators. This includes embedding value capture and developer contribution requirements early and consistently in local plans across West London.

APPENDIX A: Property Market and Opportunity Area Analysis

Appendix A has been provided as a separate report covering analysis of the West London property market and the status and progress of the Opportunity Areas. Further strategic sites identified with this analysis is also presented in Section 3.

APPENDIX B: Engagement

The table below sets out engagement taken place through the SIDP period.

Table 17 SIDP engagement

Sector	Organisation
Transport	TfL – West London wide
	Network Rail – North West and Central, Chiltern Rail, Midland Mainline and Western rail teams
	WestTrans
	Magway
	Borough contacts
Water	Thames Water
	Affinity Water
	First Business Water
Energy	National Grid
	UKPN
	SSE
	Borough contacts
	OPDC environment team
Flood	Environment Agency
	Borough contacts
Green infrastructure	Borough contacts
Digital	West London digital market engagement – 8 providers Hyper optic, Open reach, BT, Community Fibre, Virgin Media, ITS, Freshwave (i-wireless), Cellnex (previously Arqiva)
Business	Capital West London
	West London Business
Social infrastructure	West London College
	Brunel University
	Buckinghamshire New University
	Borough contacts